

LNHS

THE LONDON NATURALIST

Journal of the
LONDON NATURAL HISTORY SOCIETY

No. 76 1997



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/ SOCIETY

The Society welcomes new members, both beginners and experts. Its recording area (the London Area) lies within a 20-mile (32-km) radius of St Paul's Cathedral and here most of its activities take place. Although much covered with bricks and mortar, it is an exciting region with an astonishing variety of flora and fauna. The Society comprises Sections whose meetings are open to all members without formality. For those interested in arachnology, archaeology, botany, conchology, conservation, ecology, entomology, geology, herpetology, mammalogy, ornithology, palaeontology, or rambling, there is a Section ready to help.

Publications

The London Naturalist, published annually, contains papers on the natural history and archaeology of the London Area and beyond, including records of plants and animals.

The *London Bird Report*, also published annually, contains the bird records for the London Area for each year, as well as papers on various aspects of ornithology.

Bulletins of news items, including the Society's *Newsletter* and the *Ornithological Bulletin*, are sent to members throughout the year.

Indoor meetings

These are held in most weeks throughout the year, with lectures, discussions, colour slides and films on all aspects of natural history.

Field meetings

Led by experts to visit interesting localities, both within and outside our Area. These excursions are very popular with beginners wishing to increase their knowledge, and enable members to get to know one another.

Library

A large selection of books and journals on most aspects of natural history is available for loan or consultation by members free of charge.

Reading circles

Many important natural history journals are circulated by the Sections at a fraction of the cost of subscribing direct.

SUBSCRIPTIONS

ORDINARY MEMBERS	£15.00
JUNIOR MEMBERS	£5.00
SENIOR MEMBERS	£8.00
FAMILY MEMBERS	£3.00
AFFILIATED SUBSCRIBERS	£15.00

Junior membership is for persons under 18, or under 25 and receiving full-time education, and senior membership is for persons over 65 who have been continuous members of the Society for ten complete years. All except family members receive one free copy of *The London Naturalist* and the *London Bird Report* each year. Cheques and postal orders, payable to the London Natural History Society, should be addressed to:

The Membership Secretary, LNHS, P. C. Holland,
Flat 9, Pinewood Court, 23 Clarence Avenue,
London SW4 8LB

THE NATURAL
HISTORY MUSEUM

13 OCT 1997

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On Bookham Common, the silver-washed fritillary *Argynnis paphia* (top) was widespread and readily observed in 1996, whilst the grizzled skipper *Pyrgus malvae* (bottom) is making a small resurgence following several years in decline. Both are shown slightly enlarged.

Photos: K. J. Willmott

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Founded 1858

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89 Riddlesdown Road, Purley, Surrey CR8 1DH

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Editor, *London Bird Report*: M. A. Hardwick, The Garden Flat, 13 Southcote Road, London N19 5BJ.

Editor, *Newsletter*: Miss Joyce Dorr, Flat 3, Alleyn Court, 123-127 Sussex Gardens, London W2 2RZ.

Editor, *Ornithological Bulletin*: D. J. Montier, Eyebrook, Oldfield Road, Bickley, Bromley, Kent BR1 2LF.

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The Society's recorders

Botany

Bryophytes: Dr K. J. Adams, 63 Wroths Path, Baldwins Hill, Loughton, Essex IG10 1SH.

Flowering plants and vascular cryptogams: R. M. Burton, MA, FLS, Sparepenny Cottage, Sparepenny Lane, Eynsford, Kent DA4 0JJ (01322 863216).

Ecology and entomology

Mammals: C. Herbert, 67a Ridgeway Avenue, East Barnet, Hertfordshire EN4 8TL (0181-440 6314).

Reptiles and amphibians: T. E. S. Langton, B.SC., 12 Millfield Lane, London N6 6RA (01986 784518).

Fishes: Dr Ruth Kirk, School of Biological Sciences, Royal Holloway, University of London, Egham, Surrey TW20 0EX (01784 443266).

Arachnida: J. E. D. Milner, B.SC., 80 Weston Park, London N8 9TB (0181-341 2158).

Coleoptera (Carabidae): P. R. Mabbott, 49 Endowood Road, Sheffield S7 2LY.

Coleoptera (Lucanidae and Buprestidae): Dr D. S. Hackett, 3 Bryanstone Road, London N8 8TN (0181-292 6134).

Coleoptera (families not otherwise listed): M. Barclay, 47 Tynemouth Street, London SW6 2QS (0171-371 9095).

Lepidoptera, Syrphidae, and invertebrates not otherwise listed: C. W. Plant, B.SC., FRES, 14 West Road, Bishop's Stortford, Hertfordshire CM23 3QP (01279 507697).

Orthoptera: Vacant.

Heteroptera: E. W. Groves, 143 Westleigh Avenue, Coulsdon, Surrey CR5 3AF.

Odonata: Ms Ruth Day, B.SC., 18 Zenoria Street, London SE22 8HP (0181-693 4259).

Plant galls: K. Hill, BA, FLS, 93 Elmhurst Drive, Hornchurch, Essex RM11 1NZ (01708 456652).

Mollusca: Ms Jane Reynolds, DIP. HORT. (Kew), 21c Loraine Road, London N7 6EZ (0171-700 6258).

Geology

C/o R. E. Butler, B.SC., FGS, 205 Barnett Wood Lane, Ashted, Surrey KT21 2DF.

Ornithology

Inner London: M. A. Hardwick, The Garden Flat, 13 Southcote Road, London N19 5BJ.

Kent and Lower Thames (London Bridge to Tilbury): A. J. Morris, 134 Station Road, Crayford, Kent DA1 3QQ.

Surrey and Upper Thames (Wandsworth to Staines): S. J. Spooner, 32 Berkeley Drive, West Molesey, Surrey KT8 1RA.

Middlesex: C. Lamsdell, 4 Hardings Close, Iver Heath, Buckinghamshire SL0 0HL.

Buckinghamshire: A. V. Moon, 46 Highfield Way, Rickmansworth, Hertfordshire WD3 2PR.

Hertfordshire: A. Wilson, 14 Marina Gardens, Cheshunt, Hertfordshire EN8 9QY.

Essex: D. Lambert, 10 Chandos Road, London N17 6HN.

Records may be sent to the appropriate recorder (where shown) or to Colin Plant who will distribute to each recorder the relevant data from a mixed set of records.

Requests for information should be made to the appropriate recorder.

Contents

Silver-washed fritillary and grizzled skipper	<i>Frontispiece</i>
Officers for 1997	3
The Society's recorders	4
Report of the Society for 1996	6
Official and sectional reports for 1996	11
SPARKES, T. H., CAREY, P. D. and COOMBES, J. — First leafing dates of trees in Surrey between 1947 and 1996	15
BOREHAM, S. and MOXEY, P. A. — A century of vegetation change in Epping Forest determined from pollen analysis of pond sediments	21
WILTSHIRE, ELINOR — Uncommon trees in London	37
WILLIAMS, L. R. and FOWLER, J. A. — Towards a 'common plant census' to monitor environmental change	67
JONES, R. A. — Life on the edge — a caution on the precise demarcation of Watsonian vice-county boundaries in the London Area	79
TEAGLE, W. G. — Blackheath in the 1950s and 1960s	83
MORRIS, R. K. A. — The Hymenoptera of Mitcham Common: the fauna of a south London grass heath, with comments on the use of site quality scores for site evaluation	105
STRANGEMAN, P. J. — Notes on the birds of Nine Elms, Inner London, in the 1970s	129
PAICE, MICHAEL R. and GLAVES, PETER — A study of the sparrowhawk <i>Accipiter nisus</i> and the kestrel <i>Falco tinnunculus</i> in an urban environment	133
MILNER, J. EDWARD — Spider records for the London Area in 1996	153
PLANT, COLIN W. — A review of the butterflies and moths (Lepidoptera) of the London Area for 1995 and 1996	157
Survey of Bookham Common: Fifty-fifth year. Progress report for 1996	175
BOWLT, COLIN — The Hampstead Heath Survey: a long-term look at the Heath by the London Natural History Society	191
BURTON, RODNEY M. — Botanical records for 1996	193
Obituaries:	
ELLA MARGARET HILLMAN, 1905–1996	203
JOHN WILLIAM COLES, 1920–1997	203
Book reviews index	208

Report of the Society for 1996

Approved at the Annual General Meeting on 10 December 1996

In the past twelve months the Society has lost three of its senior honorary vice-presidents, Bernard Byerley, Pearl Small and, recently, Ella Hillman. A wealth of experience and goodwill towards our Society has been lost and we are all much the poorer by their passing. Obituaries of Bernard and Pearl appeared in *The London Naturalist* No. 75. We also have to record the deaths of G. Ayres, J. Clark, Mrs Y. A. Fish, H. V. Loewenthal, Mrs J. W. Moore, A. D. Tomlins and M. J. Wells. Total membership of the Society is virtually unchanged, as follows:

Ordinary	939
Family	117
Junior	4
Senior	125
Honorary	21
Life	7
Affiliated	28
Total	1,261

The Council has appointed E. H. Down an honorary member of the Society.

The administrative review referred to in last year's report is now all but complete. The authority of the Society's Administration and Finance Committee (A & F) has been extended, leaving the Council to decide policy matters while A & F deals with the 'day-to-day' running of the Society.

The highlight of the year was the opening of the Society's new research centre on Hampstead Heath. Colin Bowlt, now confirmed as the project leader, has put in many hours of work to bring this about so quickly and the Society is much in his debt. After over fifty years, Bookham Common Research Centre has a 'twin' north of the Thames. The project has been declared a 'Section' by the Council and a report will be published each year in *The London Naturalist*. In the meantime all members should be saying to Colin 'Congratulations and many thanks'.

At Bookham the Field Study Days have been well attended and are now an established feature of the Centre. Five such days are planned for 1997. A full report of activities at Bookham is published each year in *The London Naturalist*.

Work on surveying the gardens at Buckingham Palace is now in its second year. The arrangements for the publication of the data collected are being discussed with the Keeper of the Privy Purse. Some members of the Botany Section have begun local recording in preparation for the BSBI's Atlas 2000 project for which Rodney Burton is the co-ordinator for London and the Home Counties.

Our Conservation Officer, David Bevan, has had another busy year, assisted by members of the Nature Conservation Working Group. In March the Group's secretary, Ruth Day, organized a successful training course on methods of 'Counting Birds and Butterflies and Measuring Changes in Vegetation'. The course was led for us by Dr Dave Dawson of the London Ecology Unit and included four field meetings later in the year at Wimbledon Park and Mitcham Common. The Society is most grateful to Dr Dawson for so generously giving us his time and expertise.

The remarkable discovery by Jacqueline Shane of a population of water avens *Geum rivale* in a meadow close to Heathrow Airport resulted in a major reassessment of the site's ecological importance. Proposals by British Airports Authority to build a spur road across this meadow, linking the proposed fifth terminal to the M25 motorway, are now likely to be re-examined at the Public Inquiry. A letter was sent to the Inquiry Inspector setting out the facts and

expressing the Society's concerns. Copies were sent to English Nature, the London Wildlife Trust, the London Ecology Unit and Plantlife, and all these organizations have now included our evidence in their own submissions.

Members continued to alert the Conservation Officer to other threats to Sites of Nature Conservation Importance around London. These have ranged from concerns over free-felling operations carried out by Railtrack during the nesting season to the inappropriate development of a 'leisure facility' adjacent to the ornithologically rich Cherry Orchard Farm at Nonsuch Park in Ewell, Surrey. Written responses were sent on behalf of the Society concerning these and many other threats.

The Nature Conservation Working Group was consulted by the London Wildlife Trust over their new Biological Recording Project which may eventually lead to the setting up of a Biological Recording Centre for Greater London.

The Society is also a member of a partnership working to develop a biodiversity action plan for London. Following the Earth Summit at Rio de Janeiro in June 1992 and the publication of the National Biodiversity Action Plan for Britain in December 1995, Professor David Goode, director of the London Ecology Unit, set up a working party to find the best way to fulfil the Rio aims in London. The partnership was launched formally at the Guildhall on 19 September 1996 by James Clappison, MP, Parliamentary Under-Secretary of State for the Environment. Ruth Day represented the Society on the working party and continues to do so on the partnership committee.

It has been a quieter year on the publication front but, as part of its ongoing support for education, the Society was pleased to be able to donate copies of its Geological Drift Map together with supporting literature to some forty London libraries. At a time when all library budgets are being squeezed we are delighted to be able to help boroughs in this way and it is hoped to extend this programme in the next twelve months. Work on the new *Atlas of breeding birds* continues and publication is planned for the autumn of 1997.

The Library stock has continued to grow during the year, not only in books, but also in reports from national and local societies, and a wide range of periodicals. This past year has seen a major drive to fill gaps in established runs — including our own publications: there are now archive and shelf sets of the *Newsletter* and the *Ornithological Bulletin* — and the regular binding programme has been expanded to ensure that all this material is kept in good physical condition. To ensure the integrity of its collection the Society has created a computerized catalogue of all the bookstock. Joan Hardy started work on the database some years ago and, although she has moved to Sunderland, she and Linda Hewitt have completed the work. The Society is grateful to both of them for their dedicated time and effort over the years. Our thanks also to John Barrington for his work as Librarian since 1985. Our relations with Imperial College remain excellent and we are grateful to the staff there and, in particular, Mrs Czigány and Janice Yeadon for their support and help.

The major archive acquisition during the year was a selection of material relating to the Bookham Common Survey including an important early notebook. The existing catalogue is now definitely known to have been prepared by Mrs J. Pingree, formerly professional Archivist for Imperial College. While this catalogue is both competent and accurate it is hoped to produce a new catalogue using an electronic medium. Our Archivist, Paul Cornelius, will need help in this area and any member willing to assist should contact him. All members are urged to submit to the Archivist any material that they feel might be relevant to the history of the Society or the history of natural history itself. The archives will prove extremely useful if and when a sesquicentenary account of the Society is compiled and any archival work done now will have this purpose in mind. A fascinating find in the archives this year was that of a few audio-cassettes tucked away in a corner: voices of members past and present, some of the former sadly no longer with us, had been recorded in connection

with the Society's centenary celebrations. Although they must be among the earliest of audio-cassettes, they are very clear.

The Publications Working Group, straying a little outside its remit, has tracked down copies of the film 'London's Birds' made by Raymond Cordero and Bill Park in the early 1960s. A showing of the film with its original commentary is planned for the spring of 1998, probably at the Swedenborg Society where a conference on woodlands is due to be held in October 1997.

Many Sections are still suffering from a shortage of officers, but the integration of Geology with Ramblers and Archaeology has proceeded well to the benefit of all. Meetings continue to be well supported. Again the Society took a table at the annual exhibition of the Amateur Entomologists' Society. In the autumn we were represented at the centenary exhibition of the British Mycological Society and we are grateful to Peter Holland for his work on this project.

Sales of the Society's publications remain steady and the journals have been well received: it is gratifying to know that copies of our journals are placed in the Natural History Museum in Auckland, New Zealand — a very long way from London. To all our hard-working officers we give grateful thanks — without them the LNHS would not function.

Treasurer's report for 1995/96

The Society's financial statements for 1995/96 are presented in a new format in accordance with new regulations, and comply with the Statement of Recommended Practice on Accounting by Charities.

The financial statements show that the total net assets of the Society at the end of the financial year on 30 June 1995 were £415,023 compared with £392,962 the previous year.

Incoming resources totalled £35,958 compared with £38,251 in 1995. Net income from subscriptions (including covenant tax recoverable), at £11,613, was slightly above the 1994/95 figure of £11,320. Net investment income fell from £23,221 to £20,179. The rate of tax recoverable on covenanted subscriptions and on investment income was lower than the previous year, and will be lower again in future as a result of Budget changes.

Overall expenditure, at £40,945, was about 18 per cent lower than the previous year's figure of £49,769. This reduction is due in part to the use of cheaper printers for *The London Naturalist* and low production costs for *Bird-watching in London*, sales of which gave a substantial boost to our income from publications sales. Meetings costs, sectional and general expenditure were also lower (by some 15 per cent), but management and administrative expenses (£9,151) remained at about the same level as last year.

Summarized accounts for the year ended 30 June 1996

These summarized accounts have been extracted from the Society's annual accounts for 1995/96. They may not contain sufficient information to provide a full understanding of the financial affairs of the Society. For further information, the full accounts, the auditors' report on these accounts and the trustees' annual report should be consulted. Copies can be obtained from the Hon. Treasurer, M. J. West, 52 Trinity Road, Ware, Hertfordshire SG12 7DD.

The annual accounts were approved by the trustees on 16 November 1996.

Summarized statement of financial activities for the year ended 30 June 1996

	Unrestricted funds	
	1996	1995
	£	£
Incoming resources		
Subscriptions received from members	11,613	11,320
Interest receivable	223	172
Investment income	20,179	23,221
Publications/journals income	3,514	2,098
Other sundry income (including donations and bequests)	429	1,440
Total incoming resources	<u>35,958</u>	<u>38,251</u>
Resources expended		
Direct charitable expenditure	31,794	40,559
Management and administrative expenses	9,151	9,210
Total resources expended	<u>40,945</u>	<u>49,769</u>
Net (outgoing)/incoming resources for the year	(4,987)	(11,518)
Gains and losses on investments		
Realised gains on sale of investments	11,265	18,635
Unrealised gains/(losses) on revaluation of investments	15,783	(4,592)
Net movement in funds	<u>22,061</u>	<u>2,525</u>
Fund balance brought forward at 1 July	392,962	249,774
Prior year adjustment	—	140,663
Fund balance carried forward at 30 June 1996	<u>£415,023</u>	<u>£392,962</u>

Balance Sheet as at 30 June 1996

	1996	1995
	£	£
Fixed assets		
Tangible fixed assets for use by charity	1,588	1,831
Investments at market value: Listed	396,565	370,434
Cash	12,103	13,293
	<u>410,256</u>	<u>385,558</u>
Net current assets	<u>4,767</u>	<u>7,404</u>
Total net assets	<u>£415,023</u>	<u>£392,962</u>
Represented by:		
Unrestricted funds	<u>£415,023</u>	<u>£392,962</u>

Auditors' report follows:

Report of the auditors to the members of the London Natural History Society

We have audited the summary financial statements set out on page 9.

Respective responsibilities of trustees and auditors

The summary financial statements are the responsibility of the trustees. Our responsibility is to report to you our opinion on their preparation and consistency with the full financial statements and Annual Report.

Basis of opinion

We conducted our audit in accordance with Auditing Guideline, *The auditor's statement on the summary financial statement*, adopted by the Auditing Practices Board.

Opinion

In our opinion the summary financial statement is consistent with the full financial statements and Annual Report of the Society for the year ended 30 June 1996.

4 London Wall Buildings
LONDON EC2M 5NT
16 November 1996

FRASER RUSSELL
Chartered Accountants
and Registered Auditors

Official and sectional reports for 1996

CONSERVATION

The Nature Conservation Working Group has had another active year. In March the secretary, Ruth Day, organized a successful training course on methods of 'Counting Birds and Butterflies and Measuring Changes in Vegetation'. The course was led for us by Dr Dave Dawson of the London Ecology Unit and included four field meetings later in the year at Wimbledon Park and Mitcham Common. The Society is most grateful to Dr Dawson for so generously giving us his time and expertise.

The remarkable discovery in April by Jacqueline Shane of a population of water avens *Geum rivale* in a meadow close to Heathrow Airport resulted in a major reassessment of the site's ecological importance. The proposal by British Airports Authority to build a spur road across this meadow, linking their proposed fifth terminal to the M25 motorway, is now likely to be re-examined at the Public Inquiry. The Conservation Officer wrote to the Inquiry Inspector setting out the facts and expressing the Society's concerns. Copies of the letter were sent to English Nature, the London Wildlife Trust, the London Ecology Unit and Plantlife, and all these organizations have now included our evidence in their own submissions.

Members continued to alert the Conservation Officer to other threats to Sites of Nature Conservation Importance around London. These have ranged from concerns over tree-felling operations carried out by Railtrack during the nesting season, to the inappropriate development of a 'leisure facility' adjacent to the ornithologically-rich Cherry Orchard Farm at Nonsuch Park in Ewell, Surrey. Written responses were sent on behalf of the Society concerning these and many other threats.

The Society is a member of a partnership working to develop a biodiversity action plan for London. Following the Earth Summit at Rio de Janeiro in June 1992 and the publication of the National Biodiversity Action Plan for Britain in December 1995, Professor David Goode, director of the London Ecology Unit set up a working party to find the best way to fulfill the Rio aims in London. The partnership was formally launched at the Guildhall on 19 September 1996 by James Clappison, MP, Parliamentary Under-Secretary for the Environment. Ruth Day represented the Society on the working party and continues to do so on the partnership committee.

One of the foundations for conserving biodiversity is accurate data, and LHNS members have already contributed expert information and advice. The Nature Conservation Working Group has been consulted by another partner, the London Wildlife Trust, over their new Biological Recording Project which, it is hoped, will eventually lead to the setting up of a Biological Recording Centre for London. The aims of this project are very much in accord with the interests and agenda of the LNHS, and our unrivalled collection of records will make a major contribution to its success.

DAVID BEVAN, *Conservation Officer*

BOTANY

The Botany Section has been very active, as always, with well-attended talks and indoor sessions: the average number present at formal talks this year was forty-seven. In January Richard Mabey whetted our appetite with a talk on his new *Flora Britannica*, which has now been published, and in March Edward Milner spoke on 'Trees and Conservation'. At the AGM in November Rodney Burton gave an illustrated talk on the photographs taken by Ted Lousley on his foreign holidays. The Section also organized two general meetings: Dr Oliver Gilbert on 'Urban Rivers' in April, and John Topp on the Chagos Islands at the

end of September. Informal meetings included the usual 'Best Botanical Slides' in January to remind us of sunnier days; and two identification sessions: one on grasses in May, and a more general one in September.

One of the advantages of attending the field meetings — in addition to the pleasures of the plants, the company and the fresh air — is that they take us to places we would very probably not otherwise visit, especially if they are some distance from where we live. They have taken members even further afield than usual this year — there were even two meetings on the south coast. We began the year with a visit to the Anatomy Section of the Jodrell Laboratory at Kew. Then there were trips to Harefield, Epping Forest, Kew, Sydenham Hill, Hawkshead Woods (for a survey which took two visits), Richmond and Ham towpath (a joint meeting with the Wild Flower Society), Seaford in Sussex (two visits, one with the Sussex Botanical Recording Society), Chertsey Meads, Hampstead Heath Extension, Wisley Common, the Isle of Dogs (with the BSBI), Abney Park Cemetery, Wanstead Park, Darenth, and a fungus foray in Haringey with the London Wildlife Trust. We thank all who have addressed meetings and led field trips, and especially our two meetings secretaries who organized the events for us.

Recording for the BSBI's Atlas 2000 project, for which Rodney Burton is the Co-ordinator for London and the Home Counties, continued this year. A visit to Staines was arranged to do some recording, and in the next two years recording meetings may be organized in other ten-kilometre squares which are not well covered. The identification sessions are especially useful for the people who are trying to keep records for this project. During the year Rodney Burton, as recorder for flowering plants and vascular cryptogams, entered 9,528 records to the LNHS plant database.

John Topp, who has been efficiently organizing our full programme of field meetings for the last five years, has decided that the time has come to pass on the baton, and we are fortunate that George Hounscome has agreed to take over. Our thanks to John, who has agreed to remain on the committee. Barbara Villiers and John Latham wish to resign, and are thanked for their contribution to the committee.

RODNEY BURTON, *Chairman*, MARY CLARE SHEAHAN, *Secretary*

ECOLOGY AND ENTOMOLOGY

Once again the Section has arranged a series of stimulating lectures of interest not only to entomologists, but to all naturalists. Our informal meeting in February was particularly successful with five members, some not previously active in the Section, showing slides of a wide range of habitats and invertebrates. In April Dr Michael Majerus explained the lives and loves of ladybirds, while in June Dave Clarke described the efforts of London Zoo in the conservation of invertebrates in this country and abroad. In September we traditionally meet jointly with BENHS. On this occasion the second Brad Ashby Memorial Lecture was given by Dr Philip Sterling on the Microlepidoptera of Dorset. Following the AGM in October, our mammal recorder, Clive Herbert, described the status of nearly forty species of mammals found in the London Area. Ruth Kirk, our fish recorder, spoke to us in November on 'Diversity and Distribution of Fish in London'.

Six field meetings took place during the year, combining the aim of recording on poorly studied sites with informal training, sharing interests and assisting conservation efforts. The Linnean Society's collection of antiquarian books was the venue in January, followed by a visit to Dulwich Upper Wood for spiders in April. In May a foray along the Parkland Walk surveying for ladybirds was held, and in July a light-trap was run overnight at Camley Street, followed by a daytime meeting in an effort to record invertebrate life at that oasis for wildlife

amid an industrial landscape. In November, members had a behind-the-scenes look at the Centre for Environmental Understanding and the aquarium collection at the Horniman Museum. December saw members exploring Regent's Park for general natural history.

During the year the committee has appointed the following recorders: Ruth Day for Odonata, Jane Reynolds for Mollusca, Ken Hill for plant galls and Dr Daniel Hackett for Coleoptera (Lucanidae and Buprestidae).

Once again members of the Section represented the Society at the annual exhibition of the Amateur Entomologists' Society in October.

JOHN A. THOMPSON, *Chairman*, CATHERINE SCHMITT, *Secretary*

ORNITHOLOGY

The Section continued to run field meetings most weekends throughout the year, visiting a wide variety of sites in or around the London Area. Two of the meetings, and one indoor meeting, concentrated on bird censusing, and a field trip to Regent's Park was arranged for beginners. Summer meetings, combining birds and general natural history, particularly butterflies and dragonflies, proved popular. These are being continued and if this wider interest appeals to members they are urged to go along. Successful coach meetings were arranged to Rutland and Grafham Waters, Snettisham, Minsmere, Dungeness, Pagham Harbour, and also Itchenor and Chichester Harbour, which included a boat trip. A visit to see behind the scenes at the Ornithology Department of the Natural History Museum at Tring, looking at the egg and skin collections and the magnificent Rothschild Library, was very rewarding.

On the research side, members continued with their wildfowl counts, Common Birds Census and Waterways Bird Survey, while, under the encouragement of Derek Coleman, the BTO Regional Representative for London, an increasing number of members are participating in the BTO's new Breeding Bird Survey (BBS). A total of forty-four survey plots was covered in 1996 and eighty-eight species have been recorded in London's BBS squares since the start of the project. A rookery survey in the spring was a repeat of a census last carried out in 1975 and was completed in conjunction with a BTO sample survey. Work on the new *Atlas of breeding birds of the London Area* is proceeding.

At the Annual General Meeting in November, Helen Baker stood down as chairman of the Section after four years of sterling service, and the Section is very grateful for all the work she carried out over a longer period than she originally intended.

It is proving difficult to persuade members to take on duties within the Section and volunteers are needed. The aim is to split jobs into manageable portions so that there is not too great a workload for any individual.

ANGELA LINNELL, *Secretary*

RAMBLERS, ARCHAEOLOGY AND GEOLOGY

Since the Geology Section merged with the Ramblers and Archaeology Section, we have had an even more varied programme. During 1996 we held seventeen field meetings and eight indoor meetings, and the attendance has averaged twelve for the field and eighteen for the indoor meetings. We have often obtained local leaders for the areas visited, such as Frances Wright, a Friend of Nonsuch Park, and Tim and Jean Neal for Hampstead Heath and the little-known Pergola and Suburb. Ruth Day took us to the Rotherhithe area and Surrey Docks for dragonflies, and we had a day at Newhaven for a cliff study with Bert Wright, and a guided visit to Duck Island, St James's Park which attracted many members.

The indoor meetings sometimes attracted large audiences, the speakers being Eric Groves on the Isle of Wight, Richard Butler on historic stones, and on Malta, Pauline Pitkin on mining and quarrying in Yorkshire, John Wittich on London's river, John Court on the countryside, Mrs M. E. Smith on estovers and turbary, and Jerry Workman on the planet Mars.

We hope that we have introduced members to some areas not previously known to them, especially during the winter months when there is less natural history to study.

Finally, we would welcome any members to our committee who could take walks in their favourite areas, and we thank all our leaders during the past year.

RICHARD E. BUTLER, *Chairman*, DOREEN E. WOODS, *Secretary*

SOUTH-WEST MIDDLESEX

During the course of the year we held eight indoor meetings which were attended by an average of twelve members.

We held eleven field meetings with an average attendance of between seven and eight. The places visited were Hounslow Heath; Stocker's Lake, Rickmansworth; Bushy Park; Brent Reservoirs; Thursley Common; Runnymede; Richmond Park; Moor Lane Reserve, Staines; Broadwater Gravel Pit, Denham; Kew Gardens, and Esher Common. Our leaders were Tony Leppard, David Harris, Ray Bowden, Dr Philip Cribb, Mark Radford, Marjorie Shattock, Peter Williams, and Dr Brian Spooner.

Unfortunately, we have the not unusual problem of decreasing attendances. This is a concern because many of our committee members have served for a very long time, and some are now doing so out of loyalty, but would prefer to step down. With the decreasing attendances, new members willing to serve are not arriving.

RAY G. BOWDEN, *Chairman*, MARK RADFORD, *Secretary*

First leafing dates of trees in Surrey between 1947 and 1996

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Abstract

This paper summarizes the first leafing dates of four tree species taken largely in the vicinity of Ashstead, Surrey. We looked for a relationship between the date of leaf emergence and the weather preceding that date using Manley's central England temperatures and mean England and Wales rainfall. Warm springs were associated with an early leafing of oak, ash, horse-chestnut and lime. Wet autumns were also associated with early leafing for ash and horse-chestnut in subsequent years. These relationships suggest that an overall warming of 3°C might result in earlier leafing of the order of one to four weeks. Above and beyond these temperature effects there was evidence of a trend towards earlier leafing in oak which could not be explained.

Introduction

Phenology, the study of the timing of natural events, is undergoing a renaissance. Once the hobby of the leisured classes, including Gilbert White, it became popular during the years 1873–1947 when it was co-ordinated nationally by the Royal Meteorological Society (Clarke 1936). After the latter date, there ceased to be a national co-ordinator of records. Records continued to be taken and reported, for instance in county bird reports, but were rarely tabulated in sufficient detail to permit scientific study.

Recent concern over global climatic change has renewed interest in the study of the way that species have responded to changes in the past, in order to aid interpretation of how they may respond to changes in the future (Fitter et al. 1995, Sparks and Carey 1995). It is thought that records from the last fifty years may be vitally important in any future predictions. Such a set of records has recently come to light from the diaries of Jean Combes, and this paper summarizes these data and compares them with central England temperatures and mean England and Wales rainfall.

Materials and methods

Jean Combes made regular diary entries on the first leafing dates of ash *Fraxinus excelsior*, oak *Quercus robur*, horse-chestnut *Aesculus hippocastanum* and lime *Tilia* × *vulgaris*, where leafing was defined as when the bud scales had opened to show the colour of the leaves inside. Records for the majority of years between 1947 and 1996 are available for these four tree species. The bulk of these were recorded in the Ashted area of Surrey, although a few entries were recorded in nearby counties. In four instances an exact date is not known, the diary just records that the species was not leafing by a given date entry. For the purposes of our analyses these data have been ignored: 172 of the 200 possible entries have a given date. All but six of these entries are within 30 km latitude of Ashted. These six records have been rejected because of their place of origin; two from Berkshire, two from Bedfordshire, one from Huntingdonshire and one from Suffolk. In the 1920s a relationship known as Hopkin's Bioclimatic Law suggested a lapse of one day for each 19 miles (30 km) of latitude, thus the remaining records would be expected to differ by no more than one day from those of Ashted. In practice, all but one of these 'acceptable' records are within 13 km latitude of Ashted. Dates have been converted into days post 31 December. Leap years have been taken into consideration.

Temperature data used are the central England monthly mean temperatures published by Manley (1974), updated by Parker et al. (1992). More recent data up to 1995 have been supplied by Dr Phil Jones at the Climatic Research Unit of the University of East Anglia. Mean England and Wales monthly rainfall data (again kindly supplied by Dr Jones) up to 1991 have also been used.

First leafing dates (converted to days after 31 December) were related by stepwise regression to mean monthly temperatures and rainfall from May in the previous year to April in the current year. The residuals (unexplained elements) from the selected regression models were examined for normality, unexplained trends and serial autocorrelation.

Results

Mean first leafing dates and extreme first leafing dates are given in Table 1. There is some suggestion that there is more variability in the earlier leafing species (e.g., two-month span of dates for horse-chestnut compared to a one-month span of dates for ash). Plots of the observed dates for the four species are shown in Figure 1. Superimposed on this figure is a smoothed line (using LOWESS smoothing) to identify underlying pattern. The smoothed lines suggest that oak is leafing earlier, and that ash and horse-chestnut have been leafing earlier since 1970. The trend for lime is less clear, but a tendency for this species to come into leaf earlier is suggested after 1980.

TABLE 1. A summary of mean first leafing date, and earliest and latest first leafing dates of the four studied tree species. The number of years represented is denoted by 'n'.

	n	Mean date	Earliest	Latest
Ash	38	3 May	20 April (1949, 1993)	17 May (1957)
Oak	40	22 April	27 March (1990)	9 May (1954)
Horse-chestnut	47	26 March	13 February (1990)	17 April (1970)
Lime	41	10 April	27 March (1952, 1953, 1957, 1972, 1990)	21 April (1958, 1970, 1984)

Recently a further eleven years of Marsham family data (Sparks and Carey 1995) recorded at Stratton Strawless, Norfolk (some 160 km north of Ashtead) have become available. There is thus a potential twelve-year overlap (1947–1958) between that series and the Combes series. In general there is a good relationship between the two except for the leafing of ash (Table 2).

Stepwise linear regression revealed major relationships with temperatures between December and March (Table 3). The regression models are summarized in Table 3, and the relationship with selected monthly temperatures are shown in Figure 2. An examination of the residuals from the original model for oak showed a significant trend not accounted for by temperature or rainfall. Year has been included in the final regression model to account for this trend which appears as a tendency for earliness of the order of 0.3 days/annum. Rainfall was included in the models for ash and horse-chestnut; in both cases wet autumns were associated with earlier leafing in the following spring, whilst in the case of ash a wet spring might delay leafing.

Discussion

As might be expected, all four species showed a response to warmer spring temperatures with leafing occurring earlier. The response of each species to temperature can be expressed as the number of days earlier that a tree will come into leaf per degree Celsius. So ash is estimated to come into leaf two days earlier/°C, oak five days/°C, horse-chestnut nine days/°C and lime four days/°C. These values can be compared with those estimated for the Marsham series from 1736–1947 of six, seven, four and eight days/°C respectively (Sparks and

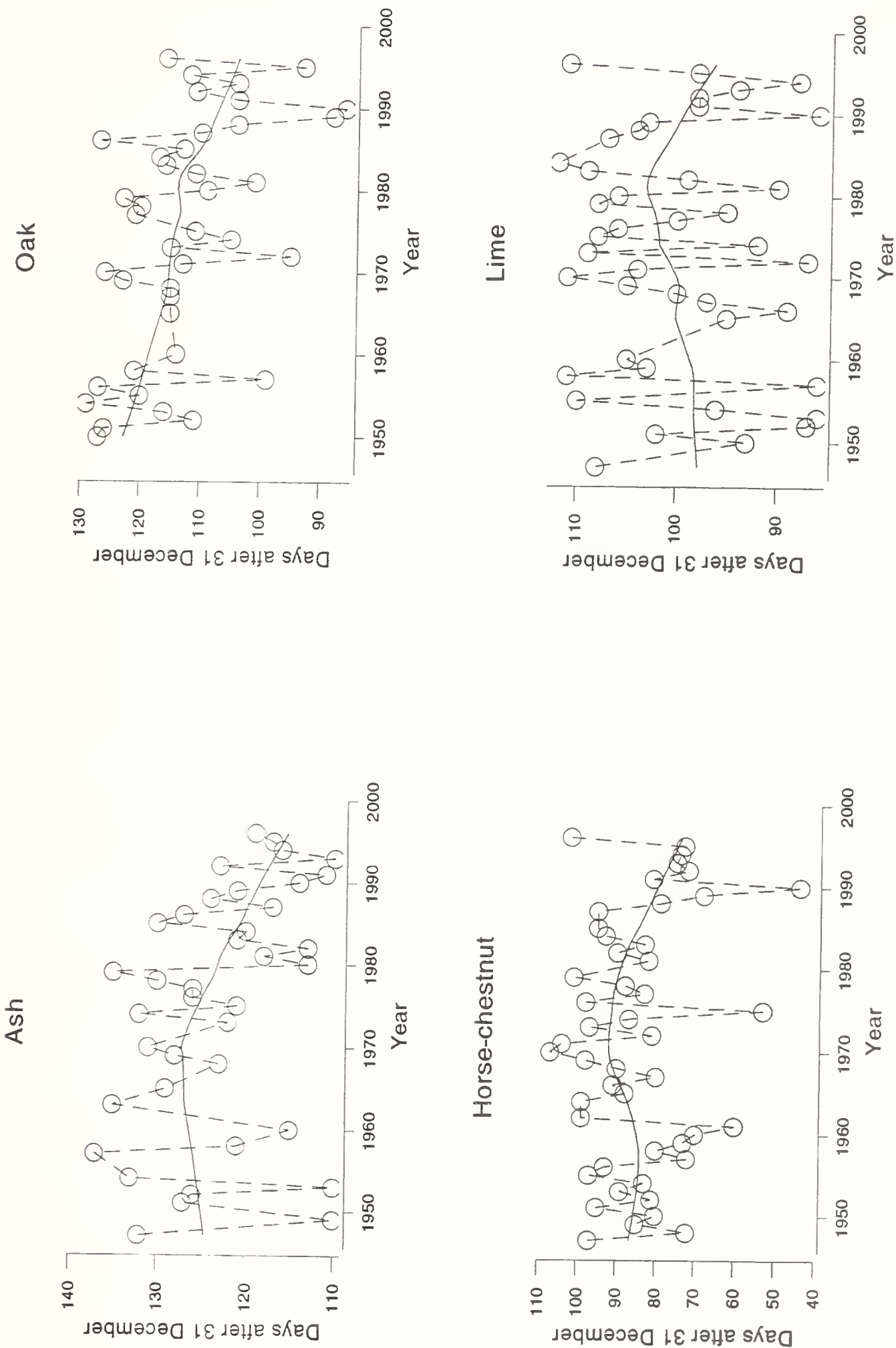


FIGURE 1. First leafing of four tree species for the years 1947–1996. The underlying trend is represented by the solid line.

TABLE 2. A summary of the mean first leafing dates and correlation between the Marsham and Combes phenological series for the years 1947–1958. Only years present in both series included.

	No. of years	Mean first leafing date		Correlation between the two series and significance
		Combes	Marsham	
Ash	8	5 May	21 April	– 0.189 n.s.
Oak	9	30 April	27 April	0.690 $p < 0.05$
Horse-chestnut	12	26 March	8 April	0.669 $p < 0.05$
Lime	9	8 April	14 April	0.721 $p < 0.05$

TABLE 3. A summary of the regression models relating first leafing dates to monthly central England temperature and rainfall.

		Ash	Oak	Horse-chestnut	Lime
Coefficients					
constant		139	157	144	121
Temp.	D			– 2.6	
	J				
	F	– 1.8	– 2.6	– 2.2	
	M		– 2.0	– 4.0	– 3.7
Rain	S			– 0.08	
	O	– 0.08			
	N				
	D	– 0.08			
	J			– 0.09	
	F	0.07			
Year (post 1900)			– 0.31		
R ²		51.1	60.4	66.4	44.9
significance		$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$

Carey 1995). The temperatures from the months from May to November appeared to have no effect on leafing date in this analysis (Table 3). However, effects of rainfall in the autumn were detected (Table 3). More rainfall effects were detected in the Combes data than we detected in the Marsham data. The correlation between the Combes and Marsham data is reasonable for all species with the exception of ash (Table 2). The lack of agreement for ash might result from a difference in the definition of leafing between the two datasets. The Marsham family defined leafing date as when the leaf was of recognizable shape, which because ash has a more complex leaf than the other species, may have led to a bigger discrepancy between the two datasets than for the other three species. This reintroduces the old argument that there is a need for standardization in any phenological data collection. Even with the problems outlined above, the link between the Marsham data and a dataset which can extend our phenological records to the modern day and the current climate is a very valuable one.

Our results suggest that autumn rainfall is associated with earlier leafing. Recent climate change scenarios for the south-east of England suggest warming linked with a decrease in precipitation. These effects of dry autumns may therefore counterbalance some of the responses of the trees to warmer winter temperature. Other confounding factors affecting leafing date are the potential effects of atmospheric pollutants, including carbon dioxide, and the effects of

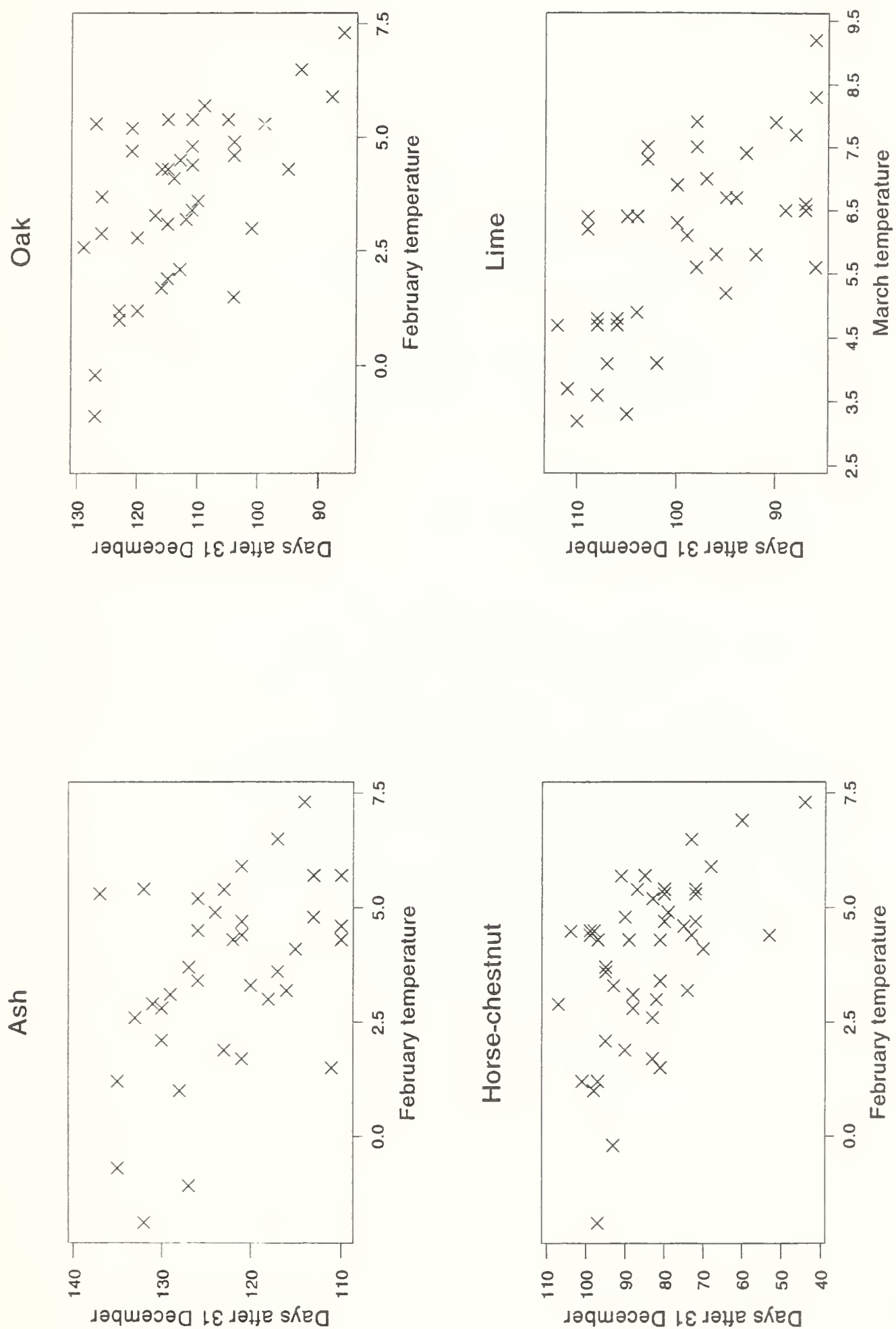


FIGURE 2. The relationship between first leafing and selected monthly temperatures for the years 1947–1996.

changes to the ozone layer. Both may have serious implications for the phenology of trees.

The clear trend in oak over and above that accounted for by temperature must remain a mystery at this stage. It may be that the use of more local climate data may account for some of the trend, but this remains to be investigated. It is also possible that the changes in oak, ash and horse-chestnut leafing date may be associated with changing atmospheric pollution (for example, the Clean Air Act 1956, or contrastingly increased emissions following completion of the M25 London Orbital motorway). Again, at the time of writing, reliable local data to investigate these phenomena are not yet available. Other questions that remain to be addressed concern the effects of earlier leafing on invertebrates and vertebrates that are dependent on the trees and how the trees may be affected by pest species if they leaf earlier. One example that readily comes to mind is the effect of winter moth *Operophtera brumata* (Linn.) on oak which is currently being investigated experimentally at ITE Bangor. We also have to investigate how leaf fall is related to climate.

In conclusion; leafing dates are becoming earlier, partly in consequence of higher winter and early spring temperatures. If global warming continues as predicted, leafing will become earlier still and our perception will be that spring arrives earlier.

Footnote

The authors will be particularly interested to learn of any further phenological data sets that readers may be aware of.

Acknowledgements

We are indebted to Phil Jones for supplying the climatic data used here. John Marsham kindly provided the additional, unpublished, Marsham family records. Gary Fry provided sufficient Norwegian calm for the first draft of this paper to be prepared.

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A century of vegetation change in Epping Forest determined from pollen analysis of pond sediments

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Contents

Abstract	21
Introduction	21
Site description and history	23
Methods	24
Results	25
Discussion	29
Conclusions	34
Acknowledgement	34
References	34

Abstract

A 3.6-metre core of sediment taken from a valley delta infill at Baldwin's Pond, Epping Forest, has been subjected to physical, magnetic susceptibility, charcoal and pollen analyses. The sequence gives a detailed record of the 110 years between 1880 and 1990. The pollen spectra produced have been interpreted to reconstruct changes in pond vegetation and woodland composition. There has been a transformation from an open-canopy woodland, with heathland areas, to a closed-canopy woodland with ageing pollards, birch scrub, declining heathland and an apparent loss of diversity. Aquatic and wetland vegetation has also changed with the infilling of the pond. The evidence from this continuous sedimentary sequence corroborates the historical records of woodland change. In addition, the rapid deltaic deposition observed highlights the relatively ephemeral nature of forest ponds, and the need for planned management.

Introduction

Epping Forest comprises about 2,428 hectares (6,000 acres) of ancient woodland, grassland, marsh and open water. It extends in a crescent from Wanstead in east London to beyond Epping in Essex (Figure 1). The main part of the forest lies on a NE-SW trending ridge consisting predominantly of London Clay and Claygate Beds with localized cappings of Bagshot Beds and Pebble Gravel.

The geology influences the vegetation, so that beech *Fagus sylvatica* and silver birch *Betula pendula* predominate on the better drained, acid sands and gravel soils of the ridge top, while hornbeam *Carpinus betulus* and oak *Quercus robur* dominate on soils developed on London Clay. Springs and flushes at the base of the sands and gravels have willow *Salix* spp., purple moor-grass *Molinia caerulea* and soft rush *Juncus effusus*.

The present woodland composition is apparently an artefact of the ancient management regime of pollarding, and to a lesser extent coppicing, which persisted until c.1880. Baker, Moxey and Oxford (1979) demonstrated broad changes in the woodland composition of Epping Forest over the last 4,000 years, whilst Layton (1985) investigated the relationship between recreation,

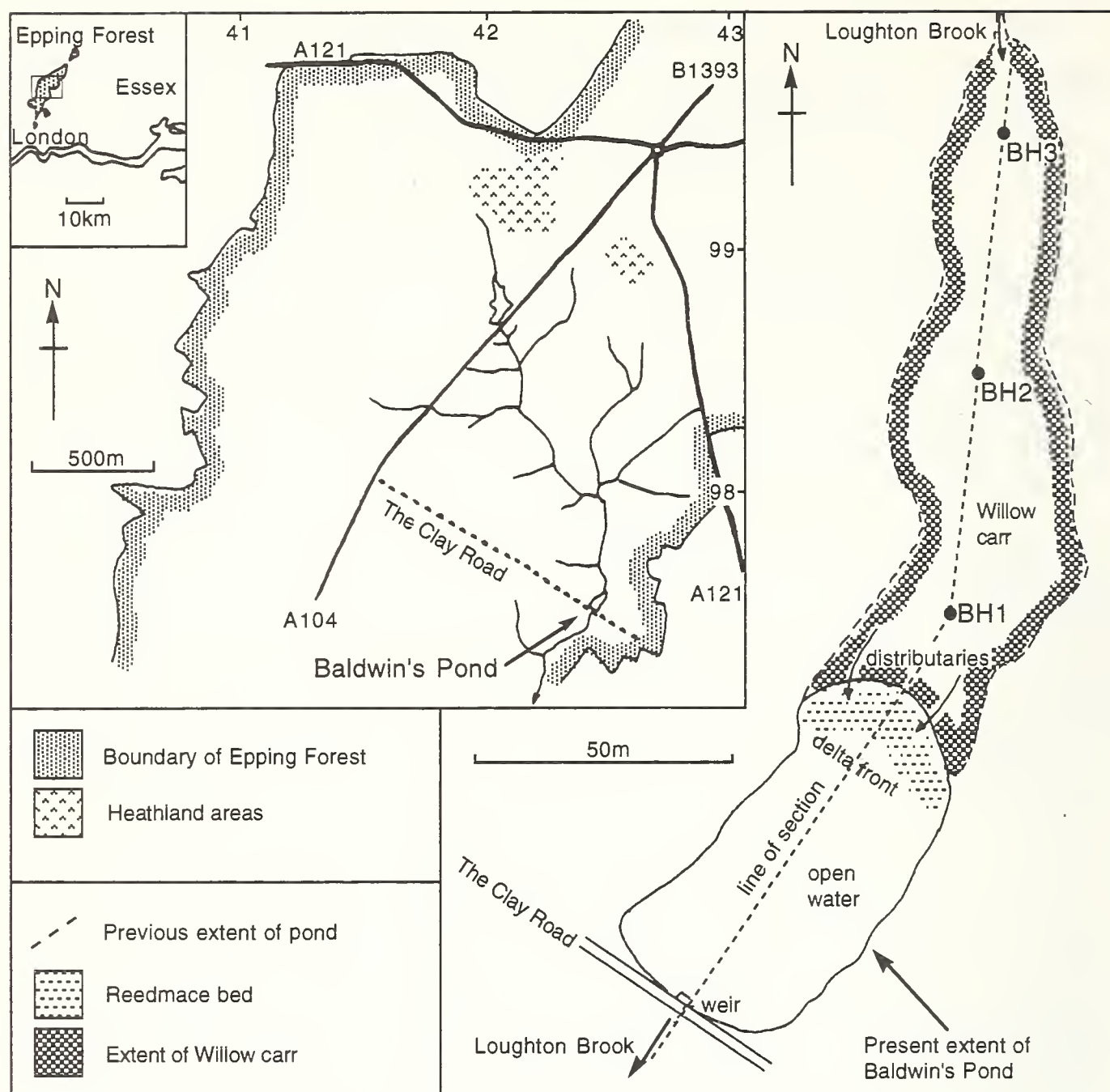


FIGURE 1. Map of the study area, showing: the location of Baldwin's Pond in relation to the catchment of Loughton Brook; the Forest boundary and areas of heathland; details of Baldwin's Pond showing its previous and present extent; distribution of willow carr and reedmace; the position of the boreholes (BH1–3); and the line of section in Figure 3.

management and vegetation in Epping Forest from 1800. There has been more vegetational change in Epping Forest over the last century than in the previous 700 years (Rackham 1978). The cessation of pollarding and coppicing has led to a reduction in the diversity and abundance of the ground flora, and the woodland understorey, due to shading by the increasingly dense tree canopy. In addition, wetland areas have been drained, and grassland and heath have been lost to woodland encroachment.

Buxton (1884) described the close cropping of vegetation by cattle and deer, so that woodland regeneration was impossible. However, by 1920 regeneration at some sites had begun, indicating that grazing pressure was falling (Layton 1985). Paulson (1922) recorded that although there had been a great increase in the number of birch trees over the previous fifty years especially encroaching on acid soils at the top of the ridge, grazing pressure at some sites apparently still gave cause for concern. Immediately after World War II there was a brief episode of increased grazing, followed by a further decline. Quist (1956)

describes well-grazed turf changing into thorn scrub with trees around 1950, when myxomatosis reduced grazing pressure from rabbits.

The Forest population of fallow deer declined almost to the point of extinction in the late 1960s and early 1970s, causing grazing pressure to fall still further. Annual counts in 1967 and 1974 showed no animals on Forest land. Although a deer sanctuary was provided at Theydon Bois in 1960, the numbers using it built up slowly, whilst the main concentration of animals was on farmland adjacent to the forest (Addison 1977). More recently the numbers of deer in the forest have recovered, and are currently at the early 1960s level.

Many of the ponds in Epping Forest were artificially created in the nineteenth century. This is true of Baldwin's Pond, which is located in a valley whose catchment of $c.2.5 \text{ km}^2$ is almost entirely within the Forest (Figure 1). This paper describes a pollen, charcoal and stratigraphic record from the sediments of Baldwin's Pond. Nomenclature of vascular plants follows Stace (1991) throughout, and incorporates the suggestions of Bennett et al. (1994) on the naming of pollen types.

Site description and history

Baldwin's Pond (National Grid reference TQ 425975) is situated on the main eastern tributary of Loughton Brook at approximately 59 m OD. It is located in a steep-sided valley with predominantly ancient woodland of oak, hornbeam and some beech to the west and north. The open grassland area of Baldwin's Hill lies to the east of the pond, with secondary woodland to the north-east. Further to the north within the catchment there are areas of heathland (Figure 1). The pond has formed against a dam which carries the Clay Road, now a track, but originally intended to be a metalled road cut through the Forest as an ill-fated speculative development in the years immediately prior to the Epping Forest Act of 1878. Although the Clay Road is shown on the 1873/4 first edition of the six-inch Ordnance Survey, there is no evidence of the pond, and presumably Loughton Brook passed beneath the Clay Road unimpeded at this time. The first cartographic evidence of the pond is in Edward North Buxton's *Epping Forest* (1884). The pond can therefore be dated to the period 1874–1884. For the purposes of this study the date of pond formation is taken as 1880.

At present the pond is of little more than 0.5 ha in extent, although it has been larger in the past. Until recently, much of the pond's surface was covered by broad-leaved pondweed *Potamogeton natans*. At the north-east end there is willow carr fringed by reedmace *Typha latifolia* swamp, through which distributaries of Loughton Brook flow. Marginal vegetation is dominated by reedmace and reed sweet-grass *Glyceria maxima*, with yellow flag *Iris pseudacorus*, arrow-head *Sagittaria sagittaria*, water horsetail *Equisetum fluviatile*, water plantain *Alisma plantago-aquatica*, water violet *Hottonia palustris* and yellow water-lily *Nuphar lutea*. However, in summer 1993 there were drastic changes in the vegetation leading to the disappearance of several species. The cause of this remains unknown.

Above the pond, Loughton Brook is fed by several streams which have incised into the underlying London Clay. These rise from spring-lines at the base of the Pebble Gravel and Bagshot Beds which cap the Epping Forest ridge. However, during prolonged dry periods, seepage from the underlying Claygate Beds can be seasonally important. Due to the decline of pollarding, there has been an increase in evapo-transpiration leading to lower groundwater levels. There is evidence to suggest that perched water tables within the Epping Forest ridge have fallen significantly during the last 100–150 years. As a result these feeder streams are now largely seasonal.

Many of the soils in the catchment belong to the Wickham soil series which tend to remain waterlogged for long periods, and exhibit rapid run-off during

the winter and any other prolonged wet periods during the year. This leads to erosion of the relatively unconsolidated sediments and high sediment transport rates in overland flow. Consequently the sediment load of streams entering Baldwin's Pond can also be rather high and as a result there has been rapid in-filling of the pond accompanied by the development of willow carr and loss of open water over the last century.

Speakman (1965) recorded in his book *A forest by night* that Baldwin's Pond was cleared out c.1950. However, the clearance was apparently confined to the deepest part of the pond near the weir. It seems very likely that the disturbance did not reach the vicinity of the willow carr and the borehole sites of this study. Therefore it appears that the present situation substantially represents some 110 years of sediment accumulation and vegetation succession (Figure 3). This is of interest since it is the only major example of long-term carr development within Epping Forest. Maps and photographs from successive years indicate that the area of the pond is now less than 25 per cent of its original size. The loss of open water is thought to have accelerated during the last 30–40 years, particularly following the dry summer of 1976, and has been noticeably rapid in the last decade.

Methods

Boreholes and coring procedure

In May 1990 three boreholes (BH1–3) were sunk within the willow carr area to form a transect through the deposits infilling the valley upstream of Baldwin's Pond. Cores from these sediments were collected using a modified Livingstone piston corer (Wright 1967). Additional samples were collected using a 5 cm-diameter hand auger.

Core sediments were extruded in the field, wrapped in plastic film, aluminium foil and thick plastic sheet, and stored in the dark at 4°C to prevent drying and oxidation before subsampling. Borehole 1 (BH1) was located in the centre of the valley close to the pond's northern margin, 86 m north-east of the weir on the Clay Road. Borehole 2 (BH2) was positioned 50 m north-east of BH1, and borehole 3 (BH3) was located a further 50 m along the valley (Figure 1). The stratigraphy of each borehole was described, and BH1 was chosen for detailed analysis since it provided the longest sequence.

Bathymetric survey

A bathymetric survey was carried out in August 1989 by the Epping Forest Conservation Centre. A boat was used to establish transects across the pond, allowing the depth of water and silt to be recorded at 5 m intervals.

Sediment analysis

Subsamples of sediment were taken at intervals along the cores from BH1 for magnetic susceptibility and loss-on-ignition analyses. Magnetic susceptibility subsamples were oven-dried at 105°C and weighed, prior to analysing using a Bartington Instruments magnetic susceptibility meter. The mass of loss-on-ignition subsamples was recorded before and after oven drying at 105°C, and ignition in a muffle furnace at 550°C. This allowed the determination of water content, and the proportion of organic and inorganic material in each sample (Bengtsson and Enell 1986).

Pollen and charcoal analysis

Subsamples of sediment were taken at intervals along the cores from BH1 for pollen and charcoal analysis. Procedures of sample preparation, pollen counting and identification, and charcoal analysis were as described by Bennett et al. (1990). A minimum sum of 300 land-pollen and spores was tallied at each

level using a pocket computer (Bennett 1990) and transferred directly to a spreadsheet on an IBM personal computer for calculation of frequencies.

Results

Lithostratigraphy

The detailed stratigraphy of the three boreholes is shown in Figure 2 using the notation system of Troels-Smith (1957). The profiles show complex sequences of silts, organic detrital muds, and peats. Although BH1 was based on London Clay, BH2 and BH3 had a basal gravel unit, presumably representing the original course of Loughton Brook before the pond was created. The remaining deposits from these boreholes can be divided into four broad lithostratigraphic units. The basal deposits comprise clays, silts and organic muds, which grade upwards into laminated silts with organic detritus. Above these are detrital wood-peats which are overlain by further silty organic detritus. Data from the bathymetric survey and from the borehole records have been compiled to construct a long section through Baldwin's Pond (Figure 3).

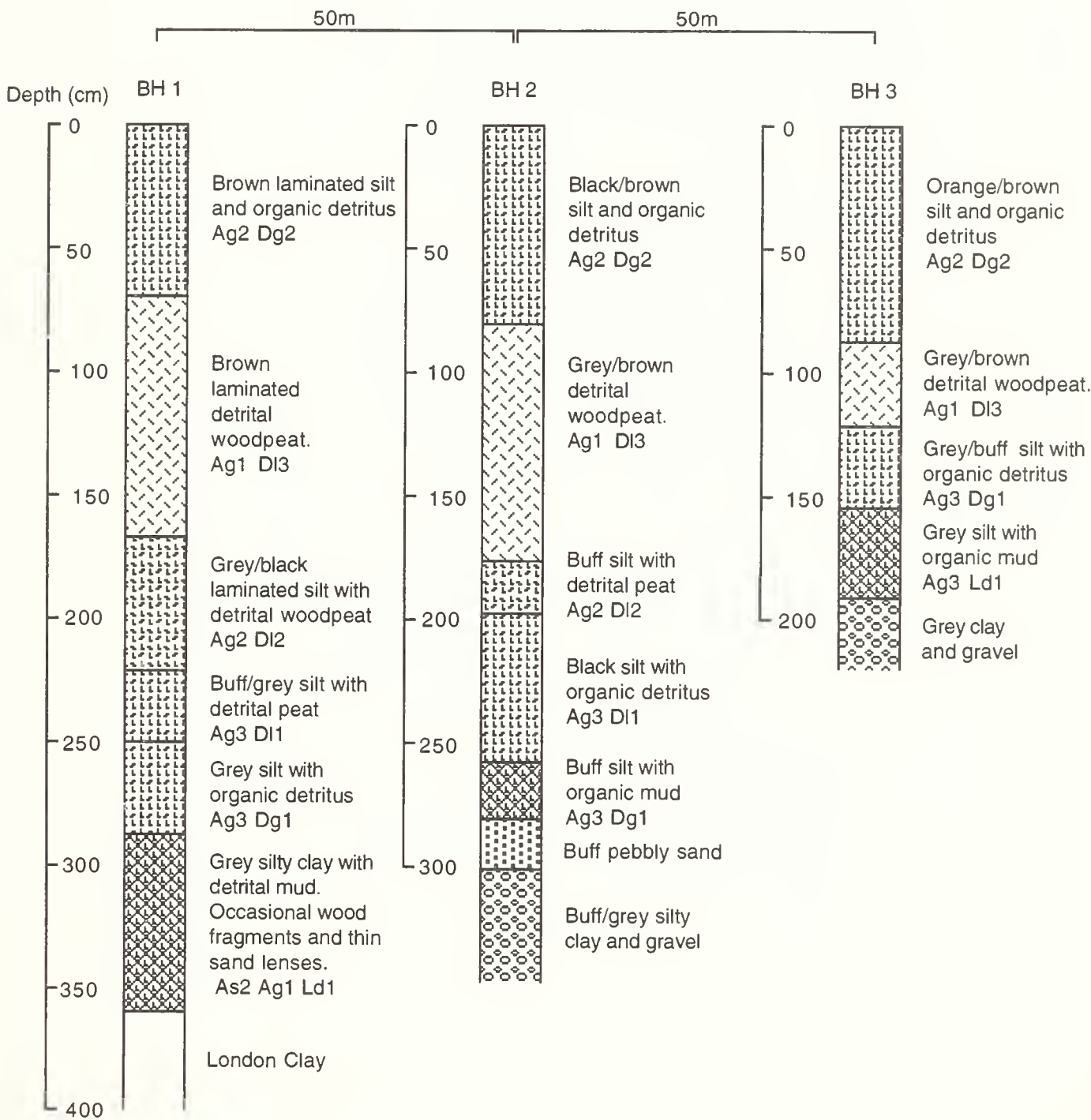


FIGURE 2. Detailed stratigraphy and sediment descriptions from Baldwin's Pond boreholes BH1-3.

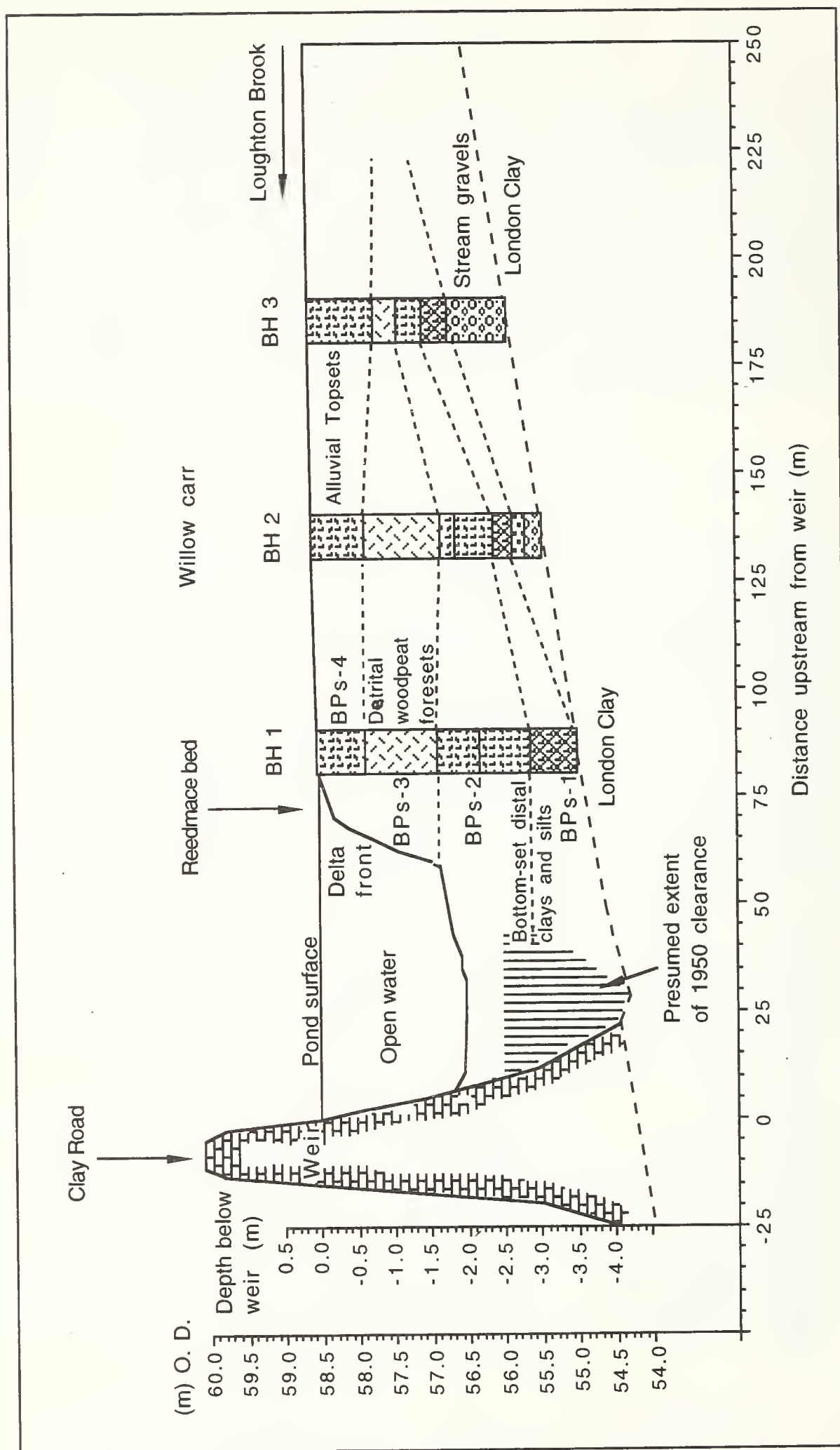


FIGURE 3. Long section through Baldwin's Pond constructed from the bathymetric survey and borehole data.

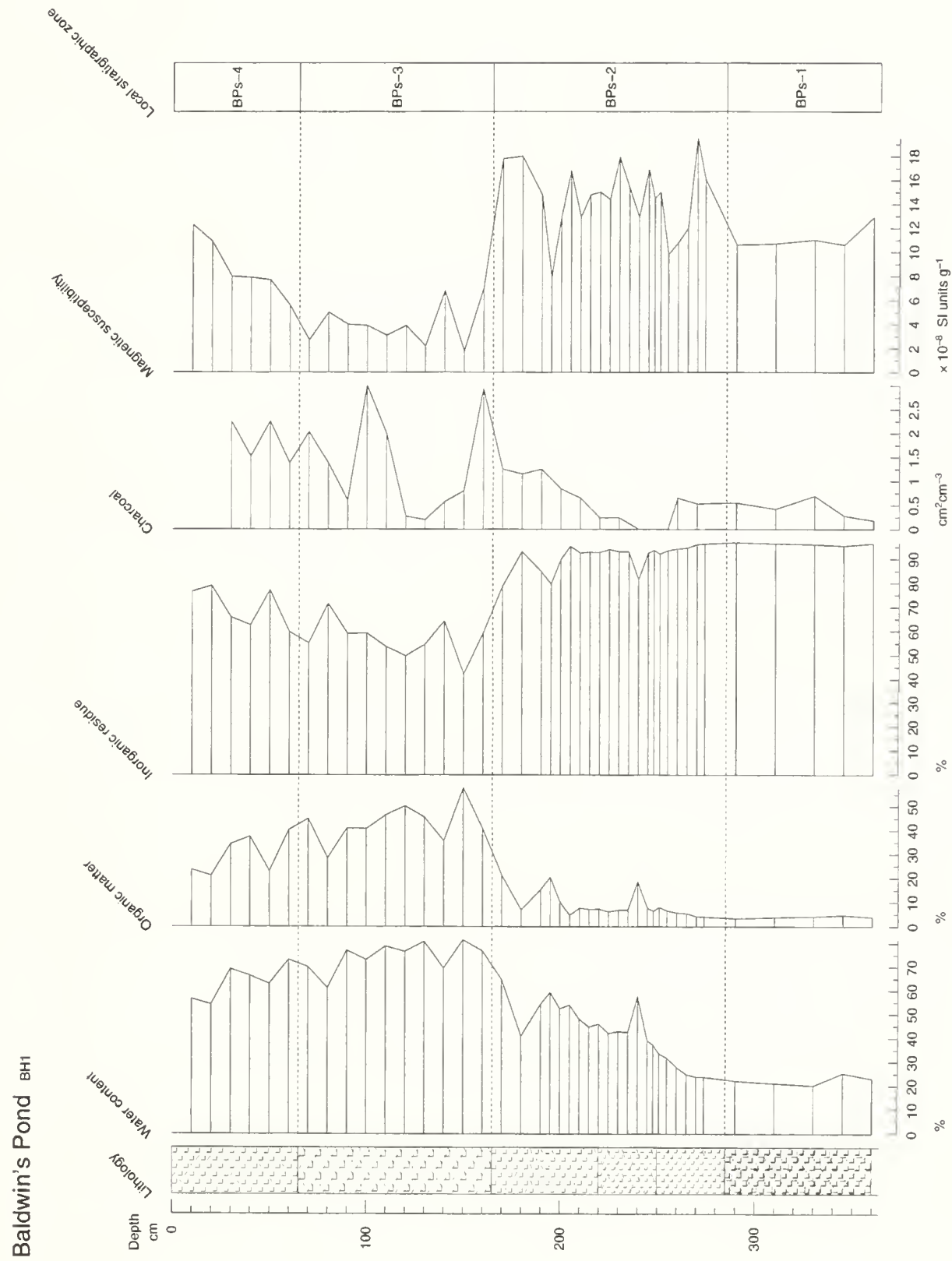


FIGURE 4. Profiles of percentage water content, organic matter (loss-on-ignition), inorganic residue and magnetic susceptibility of samples from Baldwin's Pond borehole BH1.

Physical and magnetic properties of the sediments

Profiles of percentage water content, organic matter (loss-on-ignition), inorganic residue and magnetic susceptibility of the cores from BH1 are shown in Figure 4. Below 285 cm the sediments are highly minerogenic, and have a moderately high magnetic susceptibility. Between 165 and 285 cm the sediments are generally highly minerogenic and there are several peaks in the magnetic susceptibility. In addition there are also some small peaks in the organic matter curve. Above 165 cm the sediments become more organic with a correspondingly lower magnetic susceptibility. However, above 70 cm the amount of mineral matter increases, with a corresponding rise in magnetic susceptibility towards the top of the sequence. The variations in the magnetic susceptibility probably result from changes in the amount or source of allochthonous minerals (derived from the catchment) reaching the pond. Different grain sizes and types of magnetic mineral, changing magnetic mineral preservation and authigenic formation at the water-sediment interface can all affect magnet susceptibility (Hilton and Lishman 1985, Snowball and Thompson 1988).

Figure 5 shows a plot of magnetic susceptibility against percentage inorganic residue, which reveals a broadly linear relationship. There are two data clusters for highly minerogenic sediments. Cluster I appears to correspond to the basal silty clay with organic mud, while cluster II appears to represent pulses of coarser material within the overlying laminated silts and detritus.

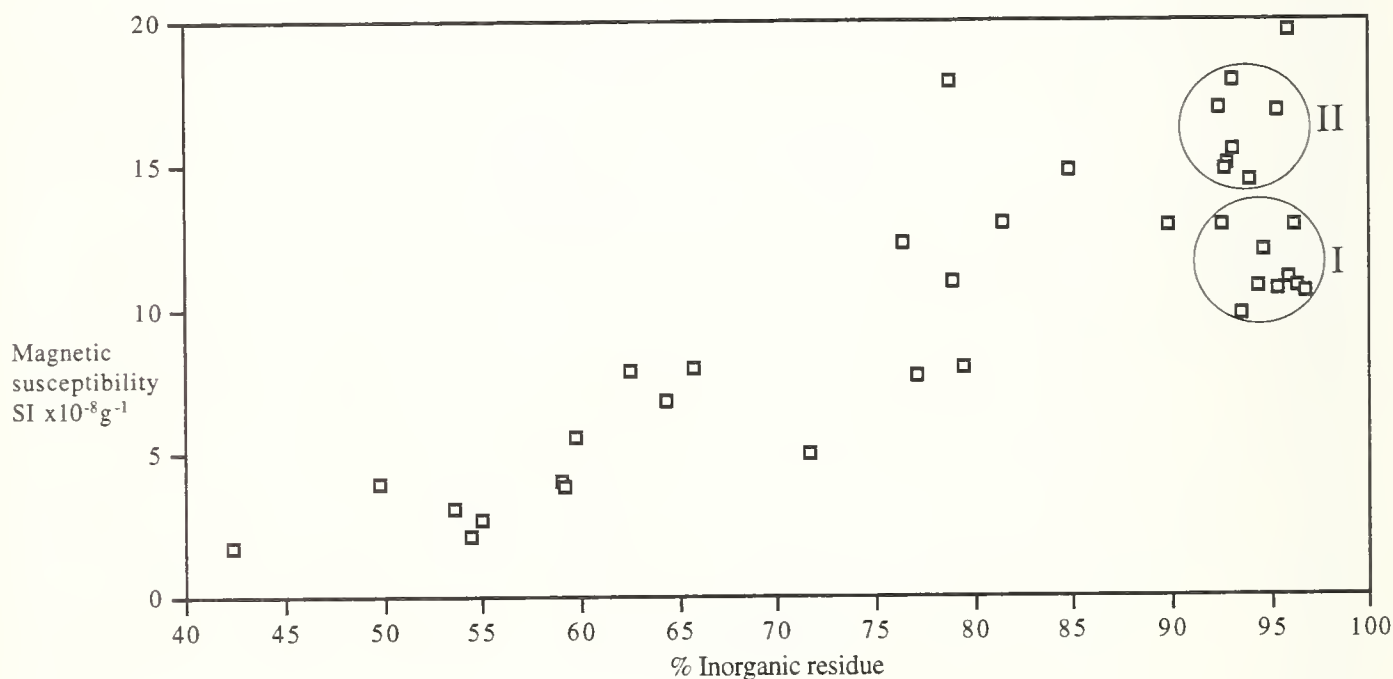


FIGURE 5. Magnetic susceptibility versus percentage inorganic residue in samples from Baldwin's Pond borehole BH1.

Charcoal analysis

The charcoal concentration curve of cores from BH1 (Figure 4) can be divided into three phases. The basal sediments from 360–220 cm have low concentrations of charcoal. There is a phase of moderate charcoal concentrations from 220–130 cm with a peak at 160 cm. Above 130 cm charcoal concentrations are moderate or high.

The following local stratigraphic zones are proposed for the Baldwin's Pond sediments, based on the sediment descriptions, physical and magnetic susceptibility and charcoal analyses, using the designation 'BPs':

BPs-1: 360–285 cm

Silts, clays and organic mud. Minerogenic sediments with low water content and moderate magnetic susceptibility $10\text{--}13 \times 10^{-8}$ SI units g^{-1} . Low charcoal content.

BPs-2: 285–165 cm

Silts with organic detritus. Minerogenic sediments with moderate water content and small peaks of organic matter. Some peaks in the magnetic susceptibility are in excess of 16×10^{-8} SI units g^{-1} . Low to medium charcoal content.

BPs-3: 165–70 cm

Detrital wood peats. Organic sediments with high water contents. Magnetic susceptibility is low $2\text{--}6 \times 10^{-8}$ SI units g^{-1} . Variable charcoal content with some high peaks.

BPs-4: 70–0 cm

Silt and organic detritus. Organic sediments becoming increasingly minerogenic with high water contents. Magnetic susceptibility increasing to 12×10^{-8} SI g^{-1} . Medium to high charcoal content.

Pollen analysis

The relationship of pollen percentages to depth for the main taxa and the total concentration of land-pollen and spores in the cores from BH1 are displayed in Figure 6. Counts for infrequent taxa are shown in Table 1. Pollen identified as hazel *Corylus avellana* or bog myrtle *Myrica gale* is assumed to represent *Corylus avellana* only. The following sequence of local pollen assemblage zones is proposed for the sediments from Baldwin's Pond, using the designation 'BPp':

BPp-1: 360–250 cm

Characterized by the presence of Ericaceae and *Corylus* pollen, with low percentages of aboreal taxa. Poaceae pollen occurs at frequencies of 20 per cent, and spores of *Pteridium*, *Polypodium* and indeterminate Pteropsida (ferns) were also abundant. Pollen concentrations are relatively low at approximately 10×10^3 grains cm^{-3} .

BPp-2: 250–185 cm

Characterized by an increase in frequencies of *Carpinus* and *Fagus* pollen, accompanied by *Quercus*, *Betula* and *Ulmus*. The pollen of *Corylus* and undifferentiated Ericaceae becomes very rare. Although the frequencies of Poaceae pollen remain high, spores of lower plants become less abundant. There is a small peak of *Myriophyllum alterniflorum* pollen at the top of the zone. Pollen concentrations increase through the zone to reach 60×10^3 grains cm^{-3} at the top.

BPp-3: 185–0 cm

Characterized by frequencies of *Betula* pollen up to 30 per cent, with *Carpinus*, *Fagus* and *Quercus* also well represented. The frequency of *Salix* pollen increases throughout the zone. Total arboreal pollen is in the range 50–70 per cent. Poaceae pollen becomes less abundant. Pollen concentrations are relatively high at between $60\text{--}80 \times 10^3$ grains cm^{-3} .

Discussion

Sedimentary history

The delta built into Baldwin's Pond by Loughton Brook over the last 100 years has extended more than 100 m along the valley. Originally, silts and clays

TABLE 1. Pollen counts for infrequent taxa from Baldwin's Pond borehole BH1.

	Depth (cm)																				
	360	330	310	290	260	240	220	200	180	160	140	120	100	80	60	40					
<i>Alnus</i>	1	1	1					4	1	1		1	1	2		1	1				
Apiaceae	1	1	2		1	2	1	3	4	7	3	1	3	1	4	1	1	1	2	1	3
Asteraceae (C/A)			1	1	1	1	2	1	1	1	1		1			1	1	1	1	1	
<i>Calluna</i>	5	6	2	1				1								1				2	
Caryophyllaceae		2						5	2		1			2							
Chenopodiaceae	2	2	1		6	2	1	3	2	2	4	1	2	2	1	1	1	2	3	3	2
<i>Epilobium</i>			1					1											1		
<i>Equisetum</i>						2	1	2		3	2	2	1	1							
<i>Filipendula</i>	2				1	2	3	4		1		1	1	1	1	3					
<i>Hedera</i>	5		1	1	1	1	2				3	3	2	1							
Lamiaceae								1													
Lycopodiaceae									1												
<i>Nuphar</i>						1		1	1			1	2		2					1	
<i>Nymphaea</i>						1			1												
<i>Persicaria bistorta</i> type						1															
<i>Plantago lanceolata</i>	1				1	2	4	3	4	2	5	2	3	1	1	3	2	1	1	1	2
<i>Potentilla</i>																1					
<i>Ranunculus</i>			1			2							4	2							
Rosaceae undiff.	1			1		2	1	1		1										1	
Rubiaceae									2												
<i>Rumex</i>	1	1			3	4	4	6	5	1	1		2	1	3	2	6	2	3	5	2
<i>Sparganium</i>	2	2	1			1	2		9	4	1	3	2								
<i>Tilia</i>	1	3		2	1	1	1	1	2	3	3	1	1				2	3	1		
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	360	330	310	290	260	240	220	200	180	160	140	120	100	80	60	40					

NB: Asteraceae (C/A) = Asteraceae (Cardueae/Asteroideae)

equivalent to stratigraphic zone BPs-1, and silts with fine-grained organic detritus equivalent to stratigraphic zone BPs-2 settled from still water throughout much of the basin. Subsequently detrital peats equivalent to stratigraphic zone BPs-3 were deposited by Loughton Brook as delta foresets at the northern end of the pond. As the delta extended down the valley, it was colonized by marsh vegetation and willow carr. Tributaries of Loughton Brook cut new channels through the carr, and deposited alluvial over-bank detrital silts equivalent to stratigraphic zone BPs-4 during episodes of temporary high water levels following spates. Since the same lithostratigraphic units were deposited in the delta at different times, these units must be diachronous (time transgressive). This sequence of fine distal sediments (bottomsets) overlain by coarser foresets, and in turn overlain by fluvial, in this case alluvial, topset sediments is exactly that expected from a prograding deltaic environment (Gilbert 1885).

Although the fine sediment adjacent to the weir was disturbed by the 1950 clearance, it appears that similar deposits further away were not (Figure 3). From the bathymetric survey it is known that at least 220 cm of undisturbed fine-grained sediment has accumulated beneath the open water of Baldwin's Pond in the 110 years since its formation. This suggests a mean sediment accumulation rate in the region of 2 cm year^{-1} . If it is assumed that these sediments are equivalent to stratigraphic zones BPs-1 and BPs-2, which they resemble in both lithology and thickness, then this accumulation rate can be applied to the sequence from BH1. The top of zone BPs-2 is 195 cm above the base of the sequence, implying that it was deposited over approximately ninety-seven years. If 1880 is taken as the date of pond formation, then the top of zone BPs-2 would be placed at about 1977. This date agrees well with maps, photographs and anecdotal evidence which give the position of the delta front along the valley at this time. Assuming that this date is reasonable, the remaining 165 cm of detrital wood-peat and silt (stratigraphic zones BPs-3 and BPs-4) accumulated over only thirteen years, giving a deposition rate of some $12.7 \text{ cm year}^{-1}$. In addition, it is likely that the over-bank detrital silts of stratigraphic zone BPs-4 were deposited at a slower rate than this, giving an even more rapid accumulation rate for the detrital wood-peats of zone BPs-3.

Taphonomy of the pollen spectra

The changing depositional environments and accumulation rates of the sediments have undoubtedly modified the pollen assemblages which they contain. Evidence of this can be seen in the close similarity between the percentage sum of tree pollen, the total pollen concentration (Figure 6) and the percentage water content of the sediment (Figure 4). In this context, water content can be taken as broadly indicative of the accumulation rate of the sediments, since the silts and clays have few interstitial spaces compared to the rapidly deposited detrital peats. Given a constant input of pollen, sediments deposited rapidly usually contain lower concentrations of pollen compared to sediments deposited more slowly. However, the distal silts and clays, from which pollen zone BPp-1 is recognized, contain low total pollen concentrations and arboreal pollen at frequencies of only 20–25 per cent.

Although Baldwin's Pond was surrounded by pollard and coppice woodland during the deposition of this sediment, the pollen spectra apparently indicate a dominance of grassland. In contrast, the rapidly deposited wood-peats from which pollen zone BPp-3 is recognized, show relatively high total pollen concentrations, with arboreal pollen at frequencies of 60–80 per cent. It would appear that the woodland catchment of Loughton Brook has focused water-borne arboreal pollen, so that it is abundant in the detrital wood-peats, despite rapid sedimentation. In contrast, the arboreal signal in zone BPp-1 must derive substantially from the local airborne pollen rain, and not from water-borne pollen collected by Loughton Brook within its wooded catchment. Thus the mode of deposition of the sediments is crucial to the interpretation of the

pollen diagram. The presence of *Pinus* pollen in the samples results largely from long-distance transport.

Charcoal analysis

The presence of charcoal fragments in the sediment represents a record of human activity, especially local fires and clearances in the Forest. In addition, more distant industrial activity and the post-war spread of stubble burning from arable farms will have contributed to the record. The taphonomy of charcoal fragments will be similar to that described for pollen. Generally, charcoal is more abundant in the upper part of the sequence where it has been focused from the catchment. However, there are some peaks in charcoal concentration which may relate to fires in the Forest following the dry summer of 1976, and woodland management in the 1980s.

Pollen synthesis

The pollen spectra from Baldwin's Pond reflect changes in pond vegetation, and in the surrounding forest. However these changes are to some extent masked by the differential taphonomy of the sediments. The distribution and abundance of vegetation types in Epping Forest is known to have changed over the last century. The area of secondary birch woodland has expanded at the expense of grassland and heath, while the pollards and coppice of the traditionally managed ancient woodland have become overgrown and senescent, causing dense shading of the understorey and ground vegetation.

From the estimation of sediment accumulation rates, it is likely that pollen zone BPp-1 represents the period 1880–1935. During this time the newly created pond was colonized by aquatic vegetation including broad-leaved pondweeds *Potamogeton* sp. (probably *natans*), reedmace *Typha latifolia*, and sedges (Cyperaceae). Woodland of hornbeam, oak, beech, birch and hazel was present in the catchment, although under represented in the pollen record, probably for taphonomic reasons, and because pollen production may have been somewhat suppressed by traditional management practices. The presence of hazel and of the polypody *Polypodium vulgare*, which is associated with the regularly cut crowns of pollard trees, are notable since they are relatively rare plants in the Forest today. It is likely that grassland with abundant bracken *Pteridium* and other ferns was present within the woodland, along rides, in glades and as open meadows. Heathland is also indicated in the vicinity.

Pollen zone BPp-2 probably represents the period 1935–1967. A notable addition to the aquatic vegetation of the pond was water-milfoil *Myriophyllum alterniflorum* determined from its distinct pollen morphology. This is a surprising find, since it is a rare plant in the area today, although *M. spicatum* is widely distributed. The occurrence of water-milfoil indicates that water depth was decreasing at the site. The woodland was dominated by ageing hornbeam pollards on the clay-rich lower slopes of the catchment close to the pond. Beech, birch and oak were also represented in the woodland, although the absence of hazel is notable. It is likely that the decline of hazel resulted from the dense shading of the understorey by the overgrowth of the neglected pollards. It is also thought that many hazel plants were deliberately 'grubbed up' at the turn of the century to discourage autumnal nut-picking excursions from the East End of London.

The polypody, bracken and other ferns were also shaded out by the closing woodland canopy. The polypody is known to have decreased substantially in the Forest over the period 1860–1960, and now the population consists of only one or two plants, excluding those in neighbouring gardens. Collection by Victorian plant hunters and increasing air pollution are also thought to be significant reasons for its decline (Payne 1959). Grassland continued to be an important habitat in the area, although heathland appears to have declined locally. Elm is poorly represented in the Forest today and appears to be a

relatively far-travelled component with the pollen spectra, perhaps from nearby farmland.

Pollen zone BPp-3 approximately represents the period 1967–1990. As the delta front passed the site, willow carr became established on the delta top. It is noteworthy that alder is relatively rare in the Forest today, and did not form a significant part of the wet woodland. The woodland in the catchment was still dominated by hornbeam, but birch increased at the expense of grassland. This is probably a result of falling grazing pressure and the establishment of birch thickets in place of dead pollards. The expansion of birch woodland was first reported by Paulson (1922), and detailed by Layton (1985) in areas adjoining the catchment. Therefore it is interesting that this should become apparent relatively late in the sequence, unless differential taphonomy has again distorted the reconstruction. It is notable that although holly is a common component of the understorey in the Forest today, it is poorly represented in the pollen assemblage. It is likely that increasing shade has suppressed flowering, and that the insect-pollinated flowers produce relatively little pollen. This may also be true of hawthorn, the pollen of which would be classified as undifferentiated Rosaceae.

Conclusions

The analysis of sediments from Baldwin's Pond has provided a record of vegetation change in Epping Forest over the last 110 years. This shows the transformation from an open-canopy woodland of managed oak, hornbeam and beech, with heathland areas, to a closed-canopy woodland dominated by ageing pollards, with declining heathland and an apparent loss of diversity. In addition, birch scrub has expanded in response to low grazing pressure. Although these findings concur with the historical evidence, they provide corroborative data from a continuous sedimentary sequence.

The extension of the delta into Baldwin's Pond gives an insight into the rapid deltaic deposition that is possible in this situation. In 110 years Baldwin's Pond has shrunk to a quarter of its original size, and without intervention will disappear within the next century. This highlights the relatively ephemeral nature of such water bodies, and emphasizes the need for planned management to ensure the continuity of aquatic habitats in particular, and to maximize biodiversity as a whole.

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Book review

The moths and butterflies of Great Britain and Ireland. Volume 3, Yponomeutidae to Elachistidae. Edited by A. Maitland Emmet. Harley Books, Colchester. 1996. 452 pp., including 9 colour plates, 8 duotone plates of larval cases, several hundred text figures and 240 distribution maps. £75 hardbound, ISBN 0 946589 43 7; £37.50 paperback, ISBN 0 946589 56 9.

This is surely one of the most eagerly awaited volumes in this excellent series, of which seven have now been published. It covers the 240 British species in the families Yponomeutidae, Glyphipterigidae, Epermeniidae, Schreckensteiniidae, Coleophoridae and Elachistidae — of which the last two must surely contain some of the most difficult to identify of the British species of Microlepidoptera and yet have never before been comprehensively treated in the British literature.

The systematic section follows the now established format of a full description, details of life history and a distribution map. There is an introductory chapter entitled 'Invasions of Lepidoptera into the British Isles' by David Agassiz, which is very interesting and extremely well written, though whether such a treatise (or indeed any of the others in earlier volumes), has a place in a work of taxonomic reference remains debatable. A particularly helpful inclusion under each family in the systematic section is an up-to-date check-list of species, with synonyms where available. This takes into account the great many changes in nomenclature in recent years and is cross-referenced to the life history chart in volume 7, part 2, by the use of the *Bradley and Fletcher* reference numbers, to make correlation possible. Also included is the latest scheme for the classification of the whole of the British Lepidoptera, taking into account all of the changes that have occurred since the publication of earlier volumes.

For me, however, it is the coverage of the Coleophoridae that is the most needed. I wonder how many other readers have, like me, a box of such insects — all looking rather similarly brown and nondescript and all without name tags? How well does this new volume enable me to get these animals put away? The starting point for most lepidopterists is, I suspect, a colour picture of the adult moth. Richard Lewington's excellent colour illustrations are indeed a very good starting point, and also serve well as confirmation that what you think you have before you actually looks like the illustrated version! The pictures cannot be faulted. However, they also serve to confirm my suspicion that there are whole sections of the Coleophoridae in which all the species look broadly similar; for one such as myself who is far more interested in recording than in arranging perfect specimens in rows, the illustrations do little towards naming the worn, brown things in my *Lepidoptera Problematica* box. As an example, take a look at the species depicted on Plate 12, Figures 16 to 29 — and then imagine these as worn examples! The next step in identification must be the dichotomous key. This seems to work quite well for well-marked, non-worn examples of several species and I was able to name several of the outstanding specimens in my box in this manner. Although many of my worn examples got lost at an early stage, this cannot in any way be said to be a fault of the key itself, which begins with the cautionary note that 'Some species cannot be readily identified by means of the key to imagines and are likely to require genitalic examination'. Such problem species are flagged in the key as a guide to the reader, but I wonder how sound this is in securing accuracy. Many lepidopterists are not entirely used to working their way through dichotomous keys and it is entirely possible, as it is with any key, for a person to make a mistake and arrive, incorrectly, at a species which is not flagged as one requiring genitalic confirmation. I think that in such a tricky group as the Coleophoridae this may lull one into a false sense of security and I am sure that an additional rider suggesting that genitalia should be examined as a matter of routine would have been of value.

Happy to say, however, that drawings of the genitalia are indeed included, and this must surely be the main value of this volume. Jozef Razowski's drawings of the genitalia of the Coleophoridae are well executed and apparently accurate. There is an interesting contrast between these drawings, which are of the genitalia in their entirety, and those of the Elachistidae which, at least for the males, illustrate only the variable parts — principally the uncus lobes, the vinculum and the right valva, with the aedeagus depicted for some groups. I find this a helpful format. It immediately steers me to those parts which require scrutiny and does not cloud the issue with unnecessary drawings of parts which do not contain diagnostic features.

The price of the hardbound volume is high, at £75, but for the serious entomologist it presents excellent value for money and I look forward with eager anticipation to the remaining four planned volumes.

COLIN W. PLANT

Uncommon trees in London

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Contents

Summary	37
Introduction	37
London's trees	39
Pollution	40
Trees in parks.....	41
Trees in cemeteries	43
Trees in streets.....	45
Conclusions.....	46
Sites of uncommon trees in London	46
Uncommon trees in London.....	55
Acknowledgements.....	65
References	65

Summary

The results of a search during 1996 for uncommon tree species in London are given. More than eighty sites, within an area about thirty kilometres by twenty kilometres, extending across the capital from Hampton Court to North Woolwich, were investigated. These sites, all accessible to the public, are mainly parks and gardens, with some cemeteries and streets. The collections of the Royal Botanic Gardens at Kew were not included. About 150 taxa rated as uncommon in Britain were recorded and are listed below.

The history of exotic trees in London is described briefly, with reference to introductions, propagation, development of public sites, and to a few of the personalities concerned. In a separate list some particulars are given of the principal sites mentioned.

Introduction

There is a great diversity of uncommon trees throughout the capital, but they are distributed among widely scattered sites. The purpose of this study is to draw attention to specimens of interest and where they may be found. It was carried out in the single season of 1996, during which period examples of over 150 species, subspecies and varieties were noted at more than eighty sites (which did not include the Royal Botanic Gardens at Kew). These lie within an area which covers about thirty kilometres by twenty kilometres, extending from Hampton Court in the west to North Woolwich in the east — locations of the principal sites are indicated on the accompanying map (Figure 1). However, this study makes no claim to be comprehensive, as no doubt there are many further sites and specimens of interest to be found within this area.

The definition of 'uncommon' is taken from Mitchell's *Trees of Britain and northern Europe* (1994: 12–13) — it implies possible absence from large areas, but not rarity in the country as a whole. A few examples of the less scarce 'infrequent' category have been included if they are particularly noteworthy in London. Other specimens are described as 'rare', which implies 'very few specimens in any one district'. These ratings apply to Britain and Ireland in general and no attempt has been made to adapt them for London. Mitchell's nomenclature (updated where necessary), places of origin and dates of introduction have in general been followed. A few species have been included which are not in his book because they are rarely seen, and some others which he omits because they are in a shrub/small-tree category and do not fit his definition of a tree as a 'woody plant that commonly achieves a height of 6 m (20 ft) on a single stem' (1994: 11). Such specimens are described in detail in

Bean's *Trees and shrubs hardy in the British Isles* (1970–88) and briefly in Hillier Nurseries' *The Hillier manual of trees and shrubs* (1995).

Nearly all the following 'uncommon trees' represent species introduced to Britain from throughout the temperate world, mainly during the past three centuries. Often it was London which provided their first non-native home, and many thrived here. Two native species not rated 'uncommon' by Mitchell have been included — *Quercus petraea* sessile oak because it is scarce over much of London, and *Ulmus glabra* wych elm, now rare through the effects of Dutch elm disease.

The principal sites mentioned are listed separately with brief notes on their origins and history.

London's trees

Britain possesses only about thirty-five native tree species. Among the best-known are *Pinus sylvestris* Scots pine, *Populus tremula* aspen, *P. nigra* ssp. *betulifolia* black poplar, *Alnus glutinosa* common alder, *Carpinus betulus* hornbeam, *Fagus sylvatica* common beech, *Quercus petraea* sessile oak and *Q. robur* English oak, *Acer campestre* field maple, *Tilia platyphyllos* large-leaved lime, *T. cordata* small-leaved lime and *Fraxinus excelsior* common ash. On the whole these are not well suited to urban conditions. Introduced species are far more abundant — five hundred or more may commonly be found — and are often conspicuously successful city dwellers.

The Romans are believed to have brought *Castanea sativa* sweet chestnut, probably *Juglans regia* walnut, and perhaps *Acer pseudoplatanus* sycamore, but a millennium was to pass before further significant tree introductions took place. *Platanus orientalis* oriental plane came around 1550, probably from south-east Europe. Then, with the development of overseas trade routes, plants of all kinds began to arrive from other continents. Among the first to collect these was the younger John Tradescant of Lambeth. He made three journeys to Virginia around the mid seventeenth century and brought back numerous species, including *Robinia pseudoacacia* false acacia and *Celtis occidentalis* nettle tree. Other early introductions were *Cedrus libani* cedar of Lebanon, *Liriodendron tulipifera* tulip tree and *Platanus* × *hispanica*, the hybrid from southern Europe which became known as 'London plane'. In 1683 Bishop Compton at Fulham Palace began to receive from John Banister, his chaplain in Virginia, plant collections which included *Liquidambar styraciflua* sweet gum and *Quercus coccinea* scarlet oak. Over the following two and a half centuries, as new areas of the temperate world became accessible, an ever-increasing variety of tree species reached Britain, many to be first propagated in London.

Although the country's first botanic garden was established at Oxford in 1621, Chelsea Physic Garden and the Royal Botanic Gardens at Kew were not founded until 1673 and 1759 respectively. New specimens reaching London were initially cultivated mainly by a few apothecaries, clerics and other enthusiasts, but soon wealthy landed proprietors were competing for these exotics. Their gardeners had a difficult task, as often they had to learn by trial and error how to grow them. For instance, according to the Society of Gardeners (1730), the tulip tree 'was formerly preserved with great care in green-houses, by which means many of them were destroy'd' — only when planted outdoors in normal fashion did it attain full size and flower freely.

At the same time the ever-increasing demand for exotic trees, shrubs and other plants led to the development of commercial nurseries. Among the first was Brompton Park Nursery, established in 1681. The Fulham Nursery was founded about 1700 and came to play a major part in the introduction of exotic trees in London, issuing in 1737 *A catalogue of American trees and shrubs that will endure the climate of England*. Over a century later, in 1843, their *Catalogue of*

hardy trees and shrubs was reviewed by Loudon (1843b), who warmly commended it as 'the most complete catalogue of hardy trees and shrubs that was ever published in this or any other country' — it included over 1,600 species and varieties.

On the east side of London, James Gordon's nursery at Mile End, founded about 1750, was one of the first to propagate *Sophora japonica* pagoda tree and *Ginkgo biloba* ginkgo. A German gardener named John Busch started a nursery in Hackney, but in 1771 left for Russia to work for the empress Catherine II. The business then flourished under Conrad Loddiges and later his son, becoming particularly noted for trees and shrubs. Loudon (1833) wrote: 'There is no garden scene about London so interesting to us as this arboretum', and suggested that an example of each specimen should be planted in the royal parks.

Private patrons played an important part in introducing and propagating new species. Dr John Fothergill (1712–1780) was one of London's most energetic. He had a sumptuous garden on the site now occupied by West Ham Park, and used the services of collectors and sea captains to introduce thousands of exotic plants. A team of artists was employed to depict them. On his death these paintings were purchased by the Russian empress, who was then planning a palace and park (Pavlovsk) near St Petersburg for her son Paul. Some years later, when Europe was rocked by the French Revolution and relations between Britain and Russia were unsatisfactory, Catherine's well-known passion for English gardening suggested a tactful sweetener. In 1795 George III instructed Sir Joseph Banks to prepare a present for her of exotic plants from Kew and have it shipped to St Petersburg. This was duly accomplished and diplomatic harmony was consolidated (Carter 1974).

Imperial expansion and development of trade routes during the nineteenth century opened up vast new areas of the world to plant collectors. Many newly-introduced tree species reached London throughout this period, and enriched the collections which we see today.

Pollution

In the mid seventeenth century, about the time that John Tradescant junior was making the first plant collections in Virginia, the use of coal was beginning to spread through the capital, adversely affecting both health and gardens. As pollution intensified native trees such as oak, beech and hornbeam were badly affected. At the same time some introduced species proved better able to cope, even in the worst urban conditions. A. D. Webster, in his comprehensive work *London trees* (1920), makes many references to this and observes: 'Foreign trees, as a rule, succeed better than native kinds . . . The British oak will not succeed in the heart of London, while the Turkey oak will' (p. 127). This fact may incidentally account for the split in London's sessile oak population, which is relatively abundant to north and south, but almost absent from the central zone. Webster also found that while coniferous trees in general fared badly in the London atmosphere, the ginkgo thrived.

Of native trees, limes proved able to survive well in London, but essential heavy pruning meant that their appearance was often marred. For the most part streets and squares were planted with a range of introduced species, including London plane, false acacia, *Ailanthus altissima* tree of heaven and ginkgo, as is evident to the present day. In parks and gardens other smoke-tolerant species were added, including poplars, wing-nuts, hickories and walnuts, oaks, sycamores, catalpas and smaller ornamental varieties. Among these were placed occasional uncommon, even rare, specimens.

Smoke pollution had been intensifying for three centuries when Richard Fitter wrote *London's natural history* (1945). His use of a few chilling statistics indicates the scale of the problem at that period: 'In Central London as much

as 322 tons of solid matter per square mile was deposited in 1936–37 at Archbishop's Park, Lambeth. This total included 43 tons of sulphates and 5 tons of tar.' At Finsbury Park in north London the situation was little better. He reckoned that on average 'in a single year nearly 30,000 tons of solid matter would be deposited from the smoky atmosphere on the County of London'. However, by the time he was writing this there were already some signs of improvement, since gas and electricity were beginning to replace coal as domestic fuel. Then the Clean Air Acts of 1956 and 1968, prohibiting smoke emissions, finally brought an end to that aspect of atmospheric pollution. The many resulting benefits included more favourable conditions for tree cultivation.

Trees in parks

While diversity of new tree species increased rapidly during the nineteenth century, space in and around London in which they could be planted was diminishing. The transformation of Marylebone hunting grounds into Regent's Park by John Nash during 1811–26 was an exception, which added to the already spacious range of central royal parks, but did nothing to relieve congestion throughout most of the city. Elsewhere housing and industrial development was engulfing market gardens and private estates, fields and woods, until over huge areas there was scarcely room for a blade of grass to grow. The terrible living conditions which ensued and their disastrous effects on the population, especially in east London, are well known. As a potential source of epidemics, they threatened the whole city. In 1833 a select committee urged the establishment of public parks to provide fresh air and contact with nature for overcrowded communities. Parliament sanctioned the establishment of Victoria Park in 1841, of Battersea Park in 1846, and of Kennington Park in 1852. The layout of each was entrusted to the government architect, James Pennethorne (1801–1871), who had worked with Nash. The horticultural features in these parks were created by John Gibson (1815–1881) (Figure 2), a very distinguished gardener who had trained under Joseph Paxton at Chatsworth, the Duke of Devonshire's opulent Derbyshire seat, and had plant-collected in India. According to an obituary tribute in *The Garden* 'He made Battersea Park more interesting, so far as the space went, than any public garden near London, and no ordinary man could have done it' (Anon. 1881).

The Great Exhibition of 1851, as is well known, brought Paxton himself to London to design the Crystal Palace. When the exhibition closed he moved it to Sydenham, where with Edward Milner (1819–1884), another landscape gardener who had trained at Chatsworth, he created a spectacular park setting (now in course of restoration).

In 1856 responsibility for these parks was delegated to the Metropolitan Board of Works, and during the 1860s additional sites were developed. Alexandra, Finsbury and Southwark Parks were laid out by Alexander McKenzie (1829–1893), a Scot of forthright opinions. He expressed these in a booklet, *The parks, open spaces and thoroughfares of London* (1869), which condemned the failure of administrators to create spacious tree-lined boulevards, as had been done in Paris. He urged that the many private squares should be opened to the public, 'their general surface improved, additional seats provided, with fountains and other decorations where needful.' He also recommended removing some pavement in Trafalgar Square (which 'painfully reflects the glare of the sun in summer, and is so cold and cheerless in winter'), and replacing it with fine vigorous trees. Incidentally, he provides an exact date for the planting of planes by Embankment Gardens: 'On the last day of the year 1868, the first of a row of plane trees (about 250 in number) was planted within the curb of the southern footway'. For parks he favoured a 'natural' look, with curving paths and open grassy spaces. He condemned attempts to create subtropical gardens,

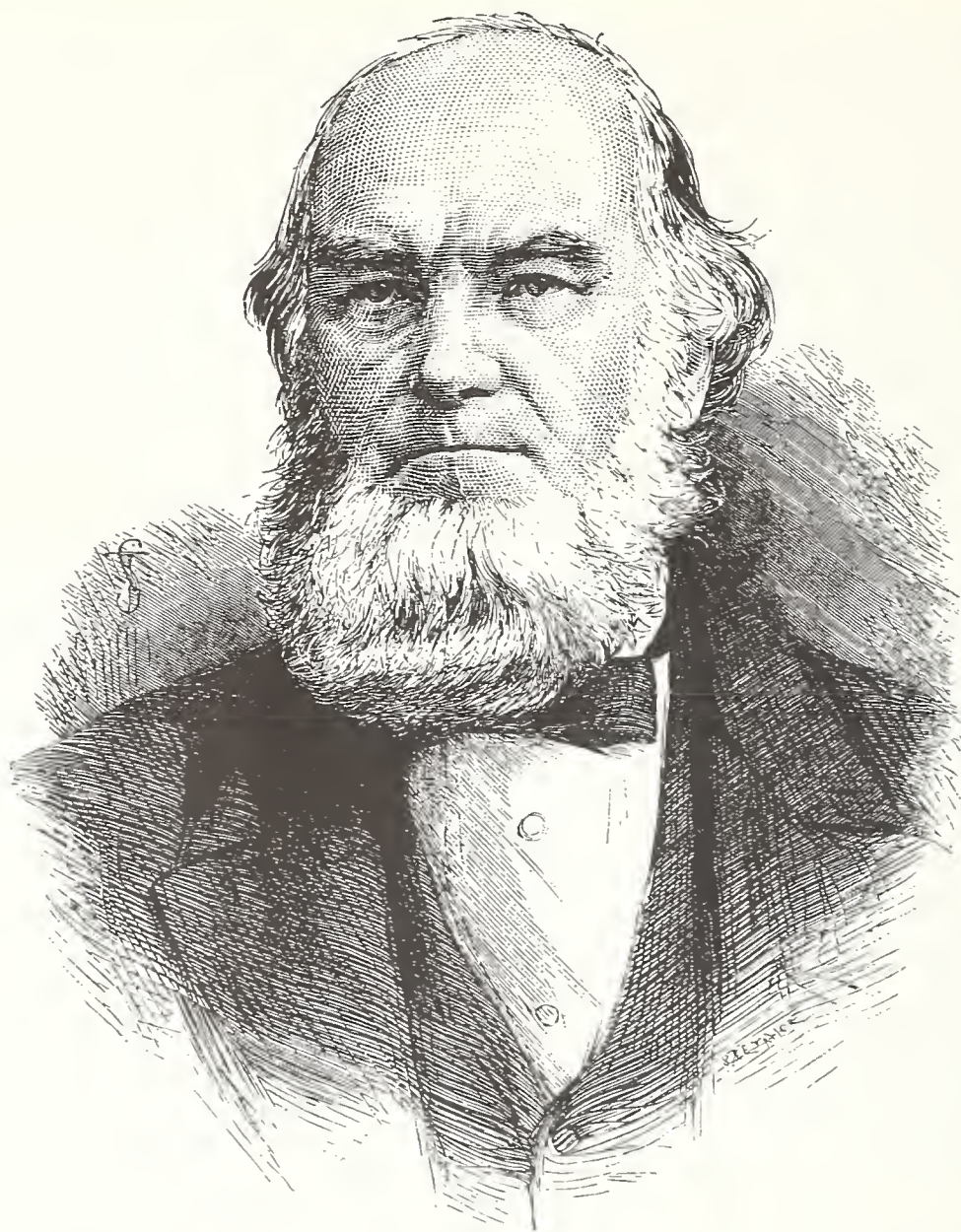


FIGURE 2. John Gibson (*The Garden*, 2 July 1881: xii).

and scorned the 'village of glass houses' in which some parks, for the sake of short-lived display, maintained plants for eight months of each year.

Around the same period the Corporation of the City of London played an important part in securing open spaces for Londoners, notably West Ham Park in 1874 and Epping Forest in 1878.

In 1888 the London County Council was established, and four years later its Parks Department was formed. Lt.-Col. J. J. Sexby (Figure 3), who had been Surveyor of Parks and Open Spaces to the Metropolitan Board of Works since 1879, became its first superintendent and remained in this position until his retirement in 1910 (Anon. 1907). New sites in built-up areas had become scarce, so during this period local authorities purchased private estates to form such parks as Central (East Ham), Clissold, Gladstone, Maryon, Ravenscourt and Springfield. Waterlow was donated by the owner. Sexby became noted for his skill in adapting these properties for public use, and for introducing novel features. He replanted the former walled kitchen garden at Brockwell Park with flowers mentioned in Shakespeare's plays, a popular late-nineteenth-century fashion. It proved so successful that he used this and similar 'old-world' notions in other parks including Peckham Rye and Ruskin. In 1898 he published *The municipal parks, gardens and open spaces of London*, a valuable work with much historical detail about the sites concerned.

A. D. Webster (c.1850–1920s) (Figure 4) was another prominent figure in



FIGURE 3. Lt.-Col. J. J. Sexby (*The Gardeners' Magazine*, 8 June 1907: 403).

the London park scene (Anon. 1909). He was born at Balmoral, where his father was manager of woodlands to Prince Albert, and for a time he followed a similar career on estates of the nobility. In 1896 he was appointed superintendent of Regent's Park, where he remained until his retirement in 1920. His deep knowledge of the capital's tree population is amply demonstrated in his *London trees* (1920), which comments on species, individual trees, sites from royal parks to private gardens, and problems of tree cultivation in the city.

Following Webster's time further private estates were acquired by local authorities to become public parks. They included Belair, Cannizaro, Fulham Palace, Gunnersbury, Holland House, Montpelier and Woodcock, all properties to the south and west of London. Much of the city remained as deprived as ever. Then about twenty years ago the Greater London Council boldly tackled the problem by clearing a large area of run-down housing and industrial sites in Southwark to create Burgess Park. Towards the Thames Estuary, near London City Airport, Beckton Park is another new development which already contains some interesting young trees.

Trees in cemeteries

During the early nineteenth century London's need for burial places was becoming increasingly acute, and in 1832 Kensal Green, the first commercial cemetery, was authorized by Parliament. By 1841 six others, including Highgate, Abney Park and Brompton, had followed. They were laid out in grandiose style with tree-lined avenues and elaborate architecture, becoming collectively



FIGURE 4. A. D. Webster (*The Gardeners' Magazine*, 16 January 1909: 41).

known as 'the magnificent seven'. Loudon saw them as potential botanic gardens, havens which would both inspire and educate the public. He wrote (1843*a*) of Abney Park, which benefited from Loddiges' nursery close by, that it contained 'one of the most complete arboretums in the neighbourhood of London, all the trees and shrubs being named'. However, as time passed and these cemeteries filled with burials such ideals had to be abandoned. But even now traces of early planting remain in Abney Park, where ancient hybrid oaks are among survivors in a jungle of secondary growth. Six of these original sites remain, in varying conditions, and are currently being preserved or adapted as public amenity areas.

The redundant city churchyards continued to suffer neglect and decay until legislation during the 1880s allowed them to be transformed into gardens and recreation grounds. The Metropolitan Public Gardens Association, formed in 1882, played a leading role in implementing this. It also helped to secure many other small sites for community use and promoted the planting of trees in public places. It continues to support these objectives.

The many large cemeteries which today lie in London's suburbs would seem to offer ideal habitats for exotic trees, but for this study it was possible to visit only a few. A fine example is the City of Westminster Cemetery in Hanwell, which contains an interesting selection including some rare species.



FIGURE 5. *Pyrus calleryana* 'Chanticleer' pear blossom in Oxford Street during April 1997.
Photo: Elinor Wiltshire

Trees in streets

The more spacious parts of London have long been well furnished with street trees — in fact eighteenth-century illustrations seem to indicate that planting went hand in hand with building. At first there were few species from which to choose. Planes were by far the most successful, with limes being fairly satisfactory. The spread of introduced species opened up exciting new possibilities. When it was proposed to plant Exhibition and other new roads in South Kensington with limes, an indignant protest appeared in the *Gardeners' Chronicle* (Anon. 1858):

'Surely it will be highly discreditable to this, the greatest horticultural country in the world, if nothing more can be found for avenues than trees employed in the days of the TUDORS . . . to have in 1858 nothing better to recommend for avenues than might indeed have been had at the Conquest.'

Oregon maple, tulip tree, oriental plane, tree of heaven and black walnut were among suggested alternatives. However, even by Webster's time diversity had not made much progress, the London plane then forming sixty per cent of the street tree population. He comments (1920) that 'during the past five-and-twenty years it has been planted to the exclusion of almost every other species . . . the almost monotonous repetition in our streets, squares and public gardens of this particular Plane is to be deplored'. He draws attention to the range of 'interesting and uncommon trees' which succeed in the city and deserve fuller use.

Although today planes appear still to dominate the city centre, Webster would surely be pleased with the great diversity now to be found throughout the capital's streets. There are *Pyrus calleryana* 'Chanticleer' pears along Oxford Street (Figure 5), *Platanus orientalis* oriental planes in Kensington High Street,

and *Corylus colurna* Turkish hazel in Sloane Street. The City of Westminster has some 7,000 trees, representing 150 different species, in its care. The Royal Borough of Kensington and Chelsea is responsible for a similar number. Larger boroughs have far more — for instance Wandsworth has 65,000. Anybody who looks closely at their neighbourhood trees may find them surprisingly varied. Alan Mitchell (1994) wrote: 'A walk through some suburban roads . . . is as good as a visit to an arboretum'. The same could be said about some inner London streets.

Conclusions

The impression gained from looking at uncommon trees in London is first of all surprise that there are so many different kinds, and then regret that there are so few of each, some well past their prime. About one-third of the taxa listed here seem to be represented by only one or two specimens, often in parks which were once private gardens. It will be noted that oaks make up about a fifth of the following list, thanks in large part to the magnificent collection in Syon Park. The hybrid *Quercus* × *crenata* Lam. (previously *Q.* × *hispanica*), in its two forms 'Lucombeana' Lucombe oak and 'Fulhamensis' Fulham oak, occurs in puzzling variety throughout London. Some are very old — a specimen in Brockwell Park, possibly a Fulham oak, fell in January 1997.

The diversity of London's tree population depends to some degree on such ancient specimens, which may not survive into the next millennium. It seems to have already diminished since 1920, when Webster published his *London trees*. Some exotics then featured in London parks have almost disappeared. Of *Maclura pomifera* Osage orange he wrote: 'In several London parks and gardens this interesting tree, which was introduced in 1818, thrives well and has attained goodly proportions.' There is currently a specimen in Chelsea Physic Garden, but it seems to have vanished from cultivation in the parks. He also mentions *Ptelea trifoliata* hop-tree, another 'rare and interesting tree', in Battersea Park, Golder's Hill Park and by Dulwich Picture Gallery. It appears to have gone from those places, but a fine example survives in Regent's Park.

Two world wars linked by economic depression, severe constraints on public spending throughout recent decades, loss of the elms, and the storm devastation of 1987, were among factors which brought London's tree population to a low state. However, during the past twenty-five years public awareness of the importance of trees has been growing, protective legislation is in force, and teams of arboricultural specialists are planning for the future. Another generation of London trees is becoming established. It is to be hoped that among them uncommon species will be well represented.

Sites of uncommon trees in London

Notes on the principal locations visited, showing the administrative bodies concerned and referring to some noteworthy specimen trees.

ABNEY PARK CEMETERY, Stoke Newington (Abney Park Cemetery Trust)

Opened in 1840, this was one of seven great burial grounds established to replace London's overcrowded churchyards. It was laid out in the style of a botanical garden and arboretum, but as it filled it became neglected and was closed in 1974. Five years later it was purchased by Hackney Borough Council with local support, and is now a nature reserve. Although much overgrown, a few old trees, including uncommon oaks and stone pines, survive from former times.

ACTON PARK (London Borough of Ealing)

Opened in 1889, on the site of a disused brickfield. Many of today's fine trees probably derive from the original planting. A London rarity is the Chinese

poplar *Populus simonii*, a tall elegant tree with drooping lower branches and diamond-shaped leaves.

BATTERSEA PARK (London Borough of Wandsworth)

Founded by Act of Parliament in 1846 and opened in 1858. It was grandly laid out by James Pennethorne and John Gibson, and contained unique features such as a subtropical garden and an imitation mountainside overhanging the lake. The latter was realistically formed from patent artificial stone known as Pulhamite and is still in place. This park by the Thames has long been one of the best tree sites in London. Webster (1920) found that 'rare and interesting specimens are constantly cropping up even in the most unexpected positions', and this is still true. Outstanding specimens include the huge old *Arbutus* × *andrachnoides* hybrid strawberry tree, and the rare *Aesculus californica* California horse-chestnut.

BECKTON DISTRICT PARK (London Borough of Newham)

An extensive recent development near London City Airport. Varied tree-planting is in progress, especially in the northern sector.

BELAIR PARK, Dulwich (London Borough of Southwark)

An early eighteenth-century villa and grounds, which became a public park in 1947. A very old *Quercus suber* cork oak, illustrated in Webster (1920), barely survives. On the opposite side of Gallery Road is a good Lucombe oak.

BROCKWELL PARK (London Borough of Lambeth)

This former private estate became a public park in 1892. Sexby replanted the walled kitchen garden with flowers mentioned by Shakespeare, and made ponds surrounded by uncommon trees. A few of these survive, including a Lucombe oak and a *Salix daphnoides* violet willow. One of these old trees, apparently a Fulham oak, fell in January 1997. Near the mansion are two fine *Quercus macranthera* Caucasian oaks.

BUSHY PARK (Royal Parks Agency)

The Waterhouse Woodland Gardens, an ornamental complex within this spacious royal park, were given their present form in 1948–9 by Joseph Fisher, then superintendent. They contain some fine trees, including a rare *Cladrastis sinensis* Chinese yellow-wood which stands near Fisher's Pond.

CANNIZARO PARK, Wimbledon (London Borough of Merton)

This property received its exotic name from the Duke of Cannizaro, a Sicilian nobleman who in former times married the local heiress. It became a public park following the death in 1947 of E. Kenneth Wilson, who had lived at Cannizaro House (now a hotel) since 1910. On this attractive hillside he created a superb garden, including a choice collection of uncommon trees and shrubs, which continues to be maintained and developed. Many London rarities may be seen here, including *Sciadopitys verticillata* Japanese umbrella pine, *Pinus coulteri* big-cone pine, *Caragana arborescens* 'Pendula' pea-tree, *Populus* × *berolinensis* Berlin poplar, and a well-known example of *Sassafras albidum*.

CENTRAL PARK, East Ham (London Borough of Newham)

This former garden of eighteenth-century Rancliffe House (demolished 1908) was acquired in 1896 as a town centre park. It possesses some notable old trees, of which the most striking are two imposing *Quercus* × *turneri* Turner's oaks. The rarest is a fine *Phellodendron amurensis* Amur cork-tree. In recent times several uncommon oaks have been planted.

CHARLTON HOUSE (London Borough of Greenwich)

This Jacobean mansion of 1612 was bought from the Maryon Wilson family in 1925 for use as a community centre. In the grounds is a good *Celtis occidentalis* nettle-tree.

CHELSEA PHYSIC GARDEN (Chelsea Physic Co. Ltd)

Founded in 1673 by The Society of Apothecaries, the historical collection of this unique garden is world famous. It includes some remarkable trees, among them the largest olive tree to be found outdoors in Britain. *Maclura pomifera* Osage orange and the shaggy-barked *Lyonothamnus floribundus* Catalina ironwood are among the wealth of rarities to be seen here.

CHISWICK HOUSE GROUNDS (London Borough of Hounslow)

The original formal layout of the gardens surrounding Chiswick House (built 1725–9) was inspired by classical Rome. Of this, many features remain and restoration works are in progress. Clipped yew hedges create secluded corners, among which stand specimens of the unusual conifer *Cunninghamia lanceolata* Chinese fir. More natural landscaping was introduced by William Kent, including 'wildernesses' with informal tree-planting. In the Western Wilderness is a very fine Lucombe oak.

CITY OF WESTMINSTER CEMETERY, Hanwell (City of Westminster)

This cemetery, established in 1854, maintains an exceptionally interesting tree collection, including *Tilia mongolica* Mongolian lime and the very rare *Quercus nigra* water oak.

CLISSOLD PARK, Stoke Newington (London Borough of Hackney)

The mansion here was built in the 1790s for the banker Samuel Hoare, to the design of his nephew Joseph Woods (1776–1864), architect and botanist. The spacious grounds were well planted, and when the property became a public park in 1889 it was with 'all the benefit of many fine trees which now form so prominent a feature in its landscape' (Sexby 1898). Webster (1920) wrote of them admiringly, mentioning a beautiful *Alnus glutinosa* 'Imperialis' cut-leafed alder. This is still to be seen, now in the form of an ancient stump but sprouting vigorous young shoots. In the bowling green enclosure is a very fine specimen of *Fraxinus pennsylvanica* red/green ash.

CRYSTAL PALACE PARK (London Borough of Bromley)

These grounds were originally laid out in the early 1850s by Joseph Paxton and Edward Milner as a setting for the Crystal Palace, which was moved to Sydenham after the Great Exhibition of 1851. Although it was destroyed by fire in 1936, plans for its reconstruction and for restoration of the park are in hand. Some old trees remain from the original planting, including a corky-barked tree of Lucombe oak type.

DOWNHILLS PARK, Tottenham (London Borough of Haringey)

This pleasant small park, formerly a private estate, was acquired in 1902 for public use. It contains some old trees, including a *Quercus × turneri* Turner's oak, and two *Q. suber* cork oaks near the southern entrance.

DULWICH COLLEGE PICTURE GALLERY (Dulwich College)

There are good trees on the lawn adjoining this building, which dates from 1817 and was Britain's first public art gallery. These include a fine *Gymnocladus dioica* Kentucky coffee-tree.

DULWICH — COLLEGE ROAD

Some outstanding trees are ranged along the northern part of this road. At the junction with the A205 is a spectacular *Zelkova carpinifolia* Caucasian elm. *Carpinus betulus* 'Incisa', a form of hornbeam, is a curiosity which has now largely reverted to type, leaving few branches with 'incised' foliage. Close by is a fine specimen of the rare *Quercus castaneifolia* chestnut-leaved oak.

ELTHAM PALACE (English Heritage)

A royal residence was established here in 1311 — a 'great hall' of the late fifteenth century survives. It was last used as a palace by Charles I, after which centuries of neglect followed. About 1930 the textile magnate Samuel Courtauld built a country house adjoining the great hall, and created a picturesque garden which has recently been restored. Some good trees may be seen here, including a fine *Fagus sylvatica* 'Heterophylla' fern-leaved beech and an *Oxydendron arboreum* sorrel-tree.

FINSBURY PARK (London Borough of Haringey)

Finsbury Park was opened in 1869. It was laid out by Alexander McKenzie in informal style with grassy spaces, curving paths, and a lake at the highest part of the site. Later features included 'American Gardens', where plants from other countries were introduced. There is a fine *Gymnocladus dioica* Kentucky coffee-tree near Manor House Gate.

FRYENT COUNTRY PARK (London Borough of Brent)

This remnant of Middlesex countryside is a semi-natural landscape with old hedgerows in which grow several *Sorbus torminalis* wild service trees (Williams 1996).

FULHAM PALACE GARDENS (London Borough of Hammersmith & Fulham)

This site was home to the bishops of London from the eighth century to 1973. In 1975 the sixteenth-century palace and grounds passed to the local authority. These gardens were made famous by Bishop Henry Compton (1632–1713), who cultivated many species newly introduced to Britain, in particular North American trees and other plants which were sent by John Banister, his chaplain in Virginia. Parts of Compton's gardens remain and are being restored, but a huge ancient *Quercus ilex* holm oak and the magnificent *Juglans nigra* black walnut are possibly the sole survivors from his time. There are many choice trees in the garden, including a rare *Cladrastis lutea* Kentucky yellow-wood. An oak tree just outside the gardens, in the allotment area, corresponds closely to a *Quercus* × *crenata* 'Fulhamensis' Fulham oak at Kew.

GLADSTONE PARK, Dollis Hill (London Borough of Brent)

Dollis Hill House and grounds were acquired for public use in 1898. They had formerly belonged to the Earl of Aberdeen, and Gladstone when prime minister used to stay here. There are old trees in the park, including a huge *Acer negundo* box elder, but the greatest variety of species is to be seen in the new 'global arboretum'. Trees from all continents are being planted, reflecting the multinational neighbourhood. These already include *Carya cordiformis* bitter-nut, *Quercus suber* cork oak, *Olea europaea* European olive, *Fraxinus americana* white ash, and a selection of eucalypts.

GOLDERS HILL PARK (London Borough of Barnet)

This attractive small park to the west of Hampstead Heath contains a fine old *Quercus* × *turneri* Turner's oak.

GREENWICH PARK (Royal Parks Agency)

This royal park was established in 1433 as a hunting ground for Henry VI, and contains many ancient oaks and sweet chestnuts. Exotics are mainly concentrated in The Gardens near Blackheath Gate. Fine specimen trees include a *Carya ovata* shagbark hickory and two remarkable examples of *Kalopanax septemlobus* (*K. pictus*) prickly castor-oil tree.

GUNNERSBURY PARK (London Boroughs of Ealing and Hounslow)

This estate was purchased by Nathan Mayer Rothschild in 1835 — the neighbouring 'small mansion' and grounds were added in 1889. It remained in Rothschild family ownership until the death of Leopold in 1917. In 1925 it was acquired for public use. The Rothschilds created magnificent gardens here and many fine trees survive, including a superb *Fagus sylvatica* 'Heterophylla' fern-leafed beech. New planting is in progress, but the Japanese garden, which contains a large *Quercus dentata* Daimyo oak and beautiful small *Sophora japonica* 'Pendula' pagoda tree, awaits restoration.

HAMPTON COURT (Historic Royal Palaces Agency)

The Wilderness, just inside the Lion Gates, is a small area which contains a choice selection of rare trees, including *Quercus dentata* Daimyo oak, *Eucommia ulmoides* gutta-percha tree, *Tetradium daniellii* euodia and *Phellodendron amurense* Amur cork-tree. In the Arboretum are other interesting trees, including the rare *Eucalyptus coccifera* funnel-fruited gum and *E. subcrenulata* Tasmanian alpine gum. On Pavilion Terrace overlooking the Thames stands a very fine *Pinus pinea* stone pine.

HANGER HILL PARK (London Borough of Ealing)

Quercus castaneifolia chestnut-leafed oak, *Q. macranthera* Caucasian oak and *Q. × turneri* Turner's oak are among a selection of recently-planted trees.

HANWELL COMMUNITY CENTRE, Cuckoo Avenue (London Borough of Ealing)

In Victorian times this was a school for poor inner-city children (Charlie Chaplin was a pupil from 1896–8). It closed in 1933 and became a civic centre. A small 'rest garden' in the grounds contains a fine *Sorbus domestica* true service tree.

HOLLAND PARK (Royal Borough of Kensington & Chelsea)

Holland House, built about 1604, suffered severe bomb damage in 1940. In 1952 the property, including gardens and woodland, was acquired for public use. The Park contains trees of outstanding quality, among them a magnificent American *Quercus macrocarpa* burr oak, considered by Mitchell to be the best specimen on this side of the Atlantic (Friends of Holland Park Newsletter, Summer 1982). *Q. pyrenaica* 'Pendula' Pyrenean oak and *Hovenia dulcis* Japanese raisin tree are among rarities to be seen here.

HYDE PARK (Royal Parks Agency)

In 1536 Henry VIII took this land from the monks of Westminster Abbey, owners since the Conquest, for use as a hunting ground. In later times it became a centre for ceremonial events, and finally a resort for all Londoners and visitors. Its tree population is noteworthy, both for abundance and for the numerous uncommon specimens to be found here. Among older trees these include *Aesculus turbinata* Japanese horse-chestnut, *Cladrastis lutea* yellow-wood

and *Rhus potaninii* Chinese varnish tree. There are young mature examples of *Tilia americana* American lime and recent plantings of *T. henryana*, *Pterocarya rhoifolia* Japanese wing-nut and *P. stenoptera* Chinese wing-nut.

KENNINGTON PARK (London Borough of Lambeth)

This park was formed from Kennington Common and opened in 1854. Webster (1920) refers to the presence of 'many hybrid oaks, the variety *Fulhamensis* occurring in most parts of the grounds, one side of a square containing about twenty-five of these trees, which average 30 feet in height'. Apparently only two now remain, and the Park's most striking feature today is a fine range of nine Lucombe oaks.

KENSAL GREEN CEMETERY (General Cemetery Company)

This was the first and most fashionable of the seven large cemeteries established around the beginning of the Victorian era. Founded in 1832, it was laid out in grandiose style, with stately architecture and tree-lined avenues. Today it contains some good trees, including oriental planes and a Lucombe oak. Also, unusually for central London, there is a *Populus nigra* var. *betulifolia* native black poplar and a *Quercus petraea* sessile oak.

KENSINGTON GARDENS (Royal Parks Agency)

William III settled in Kensington Palace in 1689, but it was Queen Caroline, wife of George II, who gave the gardens their present form. During 1728–31 The Serpentine, The Long Water and the Round Pond were created, and formal avenues (now being restored) of limes and sweet chestnuts were planted. With the introduction of new species the tree population became diversified and many unusual specimens may be found in the Gardens today. These include *Umbellularia californica* Californian laurel or 'headache-tree', a corky-barked Lucombe oak, and *Diospyros lotus* date-plum in the Flower Walk, *Tetradium daniellii* euodia near the Orangery, the rare maple *Acer obtusifolium* (*A. syriacum*) by the Albert Memorial, and the poplar *Populus yunnanensis* between the Temple summer-house and The Serpentine.

MARBLE HILL HOUSE, Twickenham (English Heritage)

In the grounds of this Palladian mansion, built in 1729, is a huge old *Juglans nigra* black walnut. A plaque beside it reads: 'This specimen, probably planted early 18th century, is reputed to be one of the largest in the country.'

MARYON PARK (London Borough of Greenwich)

This park was presented by Sir Spencer Maryon-Wilson to the London County Council in 1891. It comprises part of once-notorious Hanging Wood, haunt of highwaymen, and lies in a valley between Charlton House and the Thames. There is a *Eucommia ulmoides* gutta-percha tree near the entrance from Woolwich Road.

MONTPELIER PARK (London Borough of Ealing)

This small site formed part of the grounds of a girls' school up to 1936, and became a public park around 1955. It contains fine trees, including *Pterocarya stenoptera* Chinese wing-nut and *P. × rehderana* hybrid wing-nut.

MOUNTSFIELD PARK, Hither Green (London Borough of Lewisham)

Opened in 1905 on the grounds of a former private estate. A *Gymnocladus dioica* Kentucky coffee-tree is a handsome specimen despite past injury.

NORMAND PARK, Fulham (London Borough of Hammersmith & Fulham)

This small park was established on a World War II bomb-site. At the entrance on Lillie Road stands a fine *Tetradium daniellii* euodia.

OLD BROMPTON CEMETERY (Royal Parks Agency)

This cemetery was opened in 1840, on a site of fields and market gardens. Its layout is formal, with grandiose funerary architecture centred on a scaled-down basilica inspired by St Peter's in Rome. It contains many trees, among which are three *Acer macrophyllum* Oregon maples by the Chelsea Pensioners' monument.

OSTERLEY PARK (The National Trust)

Osterley House was built in 1575 and remodelled during the eighteenth century, mainly by Robert Adam. It is set in a spacious park of lawns, lakes and trees. Remarkable specimens include an immense *Platanus orientalis* oriental plane planted in 1755, a huge *Quercus suber* cork oak planted in 1855, a *Carya ovata* shagbark hickory and a *Q. dentata* Daimyo oak.

RADNOR GARDENS (London Borough of Richmond upon Thames)

The old *Catalpa speciosa* northern catalpa in these riverside gardens is a noted tree, mentioned in both Bean (1970–88) and Mitchell (1994).

RANELAGH GARDENS (Chelsea Royal Hospital)

During the eighteenth century London's most fashionable place of entertainment was Ranelagh's Rotunda, of which no trace remains. These leafy gardens are now part of the Royal Hospital grounds. Towards the Embankment are a *Celtis australis* southern nettle-tree and an *Acer monspessulanum* Montpellier maple.

RAVENS COURT PARK (London Borough of Hammersmith & Fulham)

This park was created in 1887 by purchase of a manor house and gardens — the house was destroyed during World War II. Uncommon trees here include a veteran *Juglans cinerea* butternut and a fine *Pterocarya stenoptera* Chinese wing-nut.

REGENT'S PARK (Royal Parks Agency)

Regent's Park was laid out in 1812 by John Nash as part of a grand residential scheme, and in 1835 was opened for public use. The Royal Botanic Society had a garden here from 1838, but it closed in 1930 when the Society disbanded. The area was reopened in 1932 and later named Queen Mary's Gardens. It contains a *Gymnocladus dioica* Kentucky coffee-tree and a *Tetradium daniellii* euodia. There is a *Fraxinus pennsylvanica* red/green ash near the children's boating pool, and a fine *Ptelea trifoliata* hop-tree south of Chester Road.

RICHMOND PARK (Royal Parks Agency)

The Isabella Plantation within this park contains choice shrubs and trees, among which are a *Quercus × schochiana* and a *Stewartia pseudocamellia* deciduous camellia. Beside Pembroke Lodge is a specimen of the rare thorn *Crataegus flabellata*.

ROE GREEN PARK, Kingsbury (London Borough of Brent)

Another former private estate. Near the house is a fine *Sorbus domestica* true service tree. A shrubbery contains an old specimen of a very curious oak, *Quercus × kewensis*: 'This remarkable evergreen hybrid oak was raised at Kew in 1914 from acorns gathered from *Q. wislizenii*, an evergreen species from California' (Bean 1970–88). The other parent was *Q. cerris* Turkey oak. The 'mother tree' still flourishes at Kew.

ROYAL VICTORIA GARDENS, North Woolwich (London Borough of Newham)

These small riverside gardens, opened in 1851, contain a beautiful *Salix lucida* shining willow.

RUSKIN PARK, Denmark Hill (London Borough of Lambeth)

This small park, opened in 1907 and laid out by Sexby, was based mainly on the gardens of eighteenth-century Dane House. It contains a small old grafted *Fraxinus pennsylvanica* red/green ash and an elegant *Robinia pseudoacacia* 'Uni-foliola' single-leaved form of false acacia.

ST ANN'S HOSPITAL, Haringey (London Borough of Haringey)

This hospital, founded in 1892, came under the administration of the London County Council in 1925. The grounds were then planted with exotic trees from a Council arboretum in Surrey. An unusual selection may still be seen, including several *Sorbus domestica* true service trees.

ST JAMES'S PARK (Royal Parks Agency)

Henry VIII acquired this royal park in 1532 as a hunting ground, but by the time of Charles II it had been developed into formal gardens inspired by Versailles. In the 1820s John Nash redesigned the Park in a more natural style. *Platanus* × *hispanica* 'Augustine Henry' a rare form of London plane, *Acer opalus* Italian maple, and *Tetradium daniellii* euodia are among the many fine trees here.

SAYES COURT PARK, Deptford (London Borough of Lewisham)

During the seventeenth century the diarist John Evelyn had a famous garden here, created over some forty years. At the end of this period, in 1698, his house was lent to the young tsar Peter the Great, then learning shipbuilding in the local yards, who notoriously damaged a precious holly hedge. The garden itself has long since vanished and only a tiny 'green space' marks the site. A few trees and shrubs include a young *Fagus sylvatica* 'Asplenifolia' fern-leafed beech and two fine *Sophora tetraptera* kowhai.

SOUTHWARK PARK (London Borough of Southwark)

This park, on the site of former market gardens, was designed by Alexander Mackenzie and opened in 1869. It contains a fine example of a national rarity, *Ulmus* × *hollandica* 'Vegeta' Huntingdon elm, and three *U. glabra* wych elms.

SPRINGFIELD PARK, Clapton (London Borough of Hackney)

On a hillside overlooking the Lea Valley, this attractive small park was formed in 1905 from the grounds of three residences, of which two were demolished. Trees include a *Juglans nigra* black walnut and a *Quercus macranthera* Caucasian oak.

SYON PARK (Syon Park Ltd)

A convent site from 1431, this property was granted to the Duke of Somerset in 1547 on suppression of religious orders. He built Syon House, and established the Park and gardens. Under Elizabeth I they passed to the Percy family, Dukes of Northumberland, still the owners. Around the 1760s the gardens were landscaped by 'Capability' Brown and a great variety of introduced trees was planted — a practice which continues to the present day. This superb collection includes many fine oaks and a range of rarities such as *Juglans mandshurica* Manchurian walnut, *Acer diabolicum* horned maple, *Aesculus glabra* Ohio buckeye, and *Fraxinus xanthoxyloides* Afghan ash.

TERRACE GARDENS, Richmond (London Borough of Richmond upon Thames)

These picturesque public gardens, descending from Richmond Hill to the Thames, were opened in 1887. They contain many trees, including a *Platanus orientalis* oriental plane and a *Sorbus domestica* true service tree.

VICTORIA PARK (London Borough of Tower Hamlets)

This spacious east London park, opened in 1845, was created by Parliament to alleviate pestilential living conditions in the area. It was laid out in splendid style by James Pennethorne with the cooperation of John Gibson, and a great variety of trees grew well. During World War II and subsequently many former glories were lost, but since 1988 a comprehensive redevelopment programme for the Park has been in progress. A plaque near Crown Gate West marks a young London plane 'planted by the Mayor of Tower Hamlets (chairman of Bow Park Board) as a symbolic gesture of the intentions of the Board to regenerate the tree population of Victoria Park which was devastated during the great storm of 16th October 1987'. Some old trees which survive in the western sector include *Quercus* × *crenata* 'Lucombeana' Lucombe oak, *Q.* × *turneri* Turner's oak, and *Fraxinus americana* white ash.

WANDSWORTH COMMON (London Borough of Wandsworth)

This stretch of common land was secured for public use in 1871. There is a small ornamental area with lakes in former gravel workings, in which are two picturesque old *Fraxinus americana* white ash trees.

WATERLOW PARK, Highgate Hill (London Borough of Camden)

This park originally formed the grounds of Lauderdale House, built in 1645 for the Duke of Lauderdale, one of Charles II's ministers. The King and Nell Gwynn are reputed to have spent time here. In 1871 the property was purchased by Sir Sidney Waterlow, who in 1889 presented it to the London County Council as 'gardens for the gardenless'. The house is now a community arts centre. There are many good trees in the Park, but the hickories, admired by Webster (1920) as 'the largest, healthiest, and handsomest in the Metropolis', have long gone. He found *Gleditsia triacanthos* honey-locust also to be doing well here — perhaps the very fine specimen near the terrace is one that he noted.

WEST HAM PARK (Corporation of London)

A botanic garden was established here in 1762 by John Fothergill, physician and botanist, who cultivated thousands of introduced species. On his death in 1780 the estate passed to the Gurney family, noted philanthropists and reformers. It was bought in 1868 by the Corporation of London, who opened it as a public park in 1874. A *Ginkgo biloba* ginkgo, planted in 1763, survives from Fothergill's day and is the oldest specimen in Britain. The Park also contains two magnificent old *Quercus* × *crenata* 'Lucombeana' Lucombe oaks with branches sweeping to the ground, and a *Carpinus betulus* 'Incisa' cut-leaved hornbeam.

WOODCOCK PARK, Kenton (London Borough of Brent)

This is a secluded small park between Harrow and Kingsbury, remnant of a private estate which was acquired by the local authority in 1951. Choice trees here include *Pterocarya* × *rehderana* hybrid wing-nut, *Celtis occidentalis* nettle-tree, and *Fraxinus pennsylvanica* red/green ash.

YORK HOUSE GARDENS, Twickenham (London Borough of Richmond upon Thames)

York House, a late-seventeenth-century mansion, is now Civic Centre of the borough. Past owners include the Indian Sir Ratan Tata, who from 1906–13 had the gardens laid out in Italian style. Some features remain, including a spectacular fountain in which marble nymphs disport. A large *Fagus sylvatica* 'Asplenifolia' fern-leaved beech stretches from the river-bank to the rose garden, but the rarest tree here is the slender *Xanthoceras sorbifolium* by the tennis courts.

Uncommon trees in London

Most of the trees on this list are described in Mitchell (1994), and their nomenclature, authorities, places of origin, dates of introduction and frequency ratings follow this work. A few rarer species are detailed in Bean (1970–88) and described briefly by Hillier Nurseries (1995).

CONIFERS

TAXODIACEAE (swamp cypress and sequoia family)

Cunninghamia lanceolata Chinese fir. China, 1804. Infrequent. Three trees in Chiswick House grounds; a young tree in Cannizaro Park.

Sciadopitys verticillata Japanese umbrella pine. Japan, 1861. Infrequent. A small tree in Cannizaro Park.

Taxodium ascendens pond cypress. Virginia to Alabama, 1789. Uncommon. A fine specimen in Syon Park.

PINACEAE (pine family)

Pseudolarix amabilis golden larch. South-east China, 1863. Rare. Young trees in Cannizaro Park, Chelsea Physic Garden, and Isabella Plantation in Richmond Park.

Pinus patula Mexican pine, Mexico, pre-1837. Rare. A young tree in Cannizaro Park.

Pinus coulteri big-cone pine. South-west California, 1632. Rare. A young tree in Cannizaro Park.

Pinus pinea stone pine. Mediterranean, probably pre-1500. Uncommon. Old trees in Abney Park Cemetery: a fine specimen on Pavilion Terrace at Hampton Court (Figure 6); a young tree in Gladstone Park.

Pinus nigra ssp. *salzmannii* (*P. nigra* var. *cebennensis*) Pyrenean pine. Southern France and Pyrenees, 1834. Rare. A very fine specimen in Syon Park.

BROAD-LEAVED TREES

SALICACEAE (willow family)

Populus nigra ssp. *betulifolia* black poplar. Native in northern and western Europe. Uncommon. At several London sites, including Barn Elms, Wandsworth Common, and riverside near Kew; two old trees by St Mary's Church at Perivale; one in Kensal Green Cemetery (Figure 7).

Populus lasiocarpa Chinese necklace poplar. China, 1900. Rare. Specimens in Battersea Park, Hanwell Cemetery, and Hampton Court Arboretum.

Populus × *berolinensis* Berlin poplar. Berlin, c.1900. Rare. A tree in Cannizaro Park.

Populus simonii, a balsam poplar with rhomboid leaves (not in Mitchell). North China, 1862. Rare. A fine tree in Acton Park; specimens in Wood End Lane at Northolt; an old tree in Woodcock Park.

Populus yunnanensis, a balsam poplar with red-veined leaves (not in Mitchell). South-west China, before 1905. Rare. A tree in Kensington Gardens, between Temple and The Long Water.

Salix daphnoides violet willow. Southern Europe, Central Asia, Himalayas, 1829. Infrequent. Hyde Park between bridge and Lido; canalside near Paddington; street trees on Barn Hill Road, Wembley.

Salix lucida shining willow (not in Mitchell). North-eastern USA, c.1830. Rare. A beautiful tree in Royal Victoria Gardens.



FIGURE 6. *Pinus pinea* stone pine overlooking the Thames at Hampton Court.

Photo: Elinor Wiltshire

JUGLANDACEAE (walnut, hickory and wing-nut family)

Pterocarya fraxinifolia Caucasian wing-nut. Caucasus, northern Iran, 1782. Infrequent. A striking feature of several London parks, including Hyde Park, Montpelier Park, Syon Park and Waterlow Park.

Pterocarya stenoptera Chinese wing-nut. China, 1860. Rare. Fine specimens in Montpelier Park and Ravenscourt Park; a smaller tree in Syon Park; a young tree in Hyde Park by Bayswater Road.

Pterocarya rhoifolia Japanese wing-nut (not in Mitchell). Japan, 1888. Rare. A newly-planted tree in Hyde Park by Bayswater Road.

Pterocarya × *rehderana* (*P. fraxinifolia* × *P. stenoptera*) hybrid wing-nut. 1879, introduced 1908. Rare. Fine specimens in Montpelier Park and Woodcock Park; a tree in Hyde Park by Hyde Park Corner Underground Station.

Juglans nigra black walnut. North America, pre-1656. Infrequent. Historic specimens in Fulham Palace Gardens and at Marble Hill, Twickenham; at a number of other sites including Battersea Park, Ravenscourt Park and Springfield Park.

Juglans cinerea butternut, a walnut with sticky shoots and hairy leaves (not in Mitchell). Eastern North America, c.1633. Rare. A large old tree in Ravenscourt Park.

Juglans mandshurica Manchurian walnut. Manchuria, N China, 1859. Very rare. A very fine tree in Syon Park.

Carya cordiformis bitternut. Eastern North America, 1689. Uncommon. A mature tree in Flower Walk, Kensington Gardens; a young tree in Gladstone Park.

Carya ovata shagbark hickory. North America, 1629. Uncommon. Fine specimens in Cannizaro Park, Greenwich Park and Osterley Park.

Carya tomentosa mockernut. North America, 1766. Rare. A tree in shrubbery near Bird Sanctuary, Hyde Park.

BETULACEAE (birch, alder, hornbeam and hazel family)

Betula maximovicziana monarch birch. Japan, c.1890. Rare. A majestic specimen in Greenwich Park.

Betula ermanii Erman's birch. North-east Asia, Japan, 1890. Rare. A magnificent tree at Hampton Court.



FIGURE 7. *Populus nigra* ssp. *betulifolia* native poplar in Kensal Green Cemetery, near the source of one of London's old streams. Photo: Elinor Wiltshire

Betula nigra river or black birch. Eastern USA, 1736. Rare. Street trees in Cranmer Road, Forest Gate.

Alnus glutinosa 'Laciniata', a cut-leaved form of common alder. Uncommon. By the lake in Regent's Park.

Alnus glutinosa 'Imperialis', another cut-leaved form of common alder. Infrequent. By the lake in Regent's Park; an ancient specimen in Clissold Park.

Alnus incana grey alder. Europe, Caucasus, 1780. Rare in gardens. A mature tree in Brockwell Park.

Alnus × *spaethii* (*A. japonica* × *A. subcordata*), a vigorous hybrid alder (not in Mitchell). Nursery origin in Germany, c.1908. A young tree by canal footbridge, Bloomfield Road, Maida Vale.

Carpinus betulus 'Incisa' cut-leaved hornbeam. A fine tree in West Ham Park; another in College Road, Dulwich, with most cut-leaved branches now reverted to type.

Carpinus orientalis eastern hornbeam. South-eastern Europe, Asia Minor, 1739. Rare. A specimen in Chelsea Physic Garden.

Ostrya carpinifolia European hop-hornbeam. Southern Europe, Asia Minor, pre-1724. Rare until recently — decorative hop-like fruits make this increasingly popular. Sites include Eltham Palace, Hanwell Cemetery, Kensington Gardens, Regent's Park and Syon Park.

Corylus colurna Turkish hazel. Southern Europe, Asia Minor, pre-1724. Once rare, but now widely planted. There are young trees along Sloane Street; in Syon Park a veteran specimen shows that it can reach huge proportions.

FAGACEAE (beech, oak and chestnut family)

Nothofagus obliqua roble beech. Argentina, Chile, 1902. Infrequent. Sites include Battersea Park, Beckton Park, Cannizaro Park, Hanwell Cemetery, Hyde Park, Kensington Gardens.

Nothofagus procera rauli. Argentina, Chile, 1913. Infrequent. Cannizaro Park.

- Nothofagus dombeyii* Dombey's southern beech. Argentina, Chile, 1916. Rare. Battersea Park and Cannizaro Park; a young tree in Gunnersbury Park.
- Nothofagus cunninghamii*, a Tasmanian southern beech. Tasmania, c.1860. Rare. A newly-planted tree in Bywater Street, Chelsea.
- Nothofagus betuloides* oval-leaved southern beech. Chile, 1830. Rare. A young tree at Eltham Palace.
- Nothofagus solandri* var. *cliffortioides* mountain beech. New Zealand, c.1880. Rare. A specimen in Chelsea Physic Garden.
- Fagus sylvatica* 'Purpurea Tricolor' a beech cultivar with pink-edged purple leaves. France, 1879. Rare. A mature tree in Syon Park; a young tree in Hyde Park near Bayswater Road.
- Fagus sylvatica* 'Asplenifolia' fern-leaf beech. Europe, 1820. Not uncommon, but some fine specimens are noteworthy, for instance at Eltham Palace, Gunnersbury Park and York House Gardens.
- Fagus sylvatica* 'Rotundifolia' round-leaved beech. Surrey, 1870. Rare. Hanwell Cemetery.
- Quercus myrsinifolia* bamboo-leaved oak. China, Japan, 1854. Rare. Syon Park.
- Quercus phellos* willow oak. Eastern USA, 1723. Infrequent. Cannizaro Park, Syon Park, and newly-planted trees in Hyde Park and Kensington Gardens.
- Quercus imbricaria* shingle oak. South-eastern USA, 1786. Infrequent, Syon Park.
- Quercus nigra* water oak. South-eastern USA, 1723. Very rare. A fine specimen in Hanwell Cemetery.
- Quercus* × *leana* (*Q. imbricaria* × *Q. velutina*) Lea's hybrid oak. North America, pre-1850. Rare. Syon Park.
- Quercus marilandica* black-jack oak. Eastern USA, pre-1739. Very rare. A veteran tree in Osterley Park.
- Quercus velutina* black or quercitron oak. Eastern and central USA, 1800. Infrequent. A young tree in Cannizaro Park.
- Quercus* × *schochiana* (*Q. palustris* × *Q. phellos*) a willow-leaved hybrid oak (not in Mitchell). Germany, c.1894. Rare. A tree in Isabella Plantation, Richmond Park.
- Quercus castaneifolia* chestnut-leaved oak. Caucasus, Iran, 1846. Rare. Fine specimens in College Road, Dulwich, Syon Park and Battersea Park; young trees in Cannizaro Park, Central Park and Hanger Hill Park.
- Quercus libani* Lebanon oak. Asia Minor, 1855. Rare. Young trees in Central Park and Hyde Park.
- Quercus suber* cork oak. Southern Europe, northern Africa, 1699 or earlier. Infrequent. Monumental specimens in Cannizaro Park and Osterley Park; a splendid old tree in Littlecote Close, off Beaumont Road, Wandsworth (Figure 8); an ancient tree in Belair Park; two old trees in Downhills Park; two young trees in Gladstone Park and one in Hyde Park.
- Quercus* × *crenata* (*Q. cerris* × *Q. suber*) 'Lucombeana' Lucombe oak. Exeter, 1762. A hybrid of which there are many forms, some with corky bark. Two magnificent specimens in West Ham Park (Figure 9) and a fine tree in Chiswick House Grounds; a mature tree in Gallery Road, Dulwich; others in Brockwell Park, Crystal Palace, Hyde Park, Kennington Park, Kensal Green Cemetery, Kensington Gardens and Syon Park; young trees in Fulham Palace Gardens, Hampton Court, Hyde Park and Kensington Gardens.
- Quercus* × *crenata* (*Q. cerris* × *Q. suber*) 'Fulhamensis' Fulham oak. Said to have originated in Fulham in 1760s. Uncommon and variable. A fine tree in Syon Park. Specimens in Hyde Park and Fulham Palace Gardens (in allotment area) correspond closely to an example at Kew. Mature specimens by the store yard in Kennington Park and by Marlborough Gate in Kensington Gardens appear to resemble each other.
- Quercus* × *turneri* (*Q. ilex* × *Q. robur*) Turner's oak. Leyton, Essex, pre-1783. Infrequent. Two fine old trees in Central Park; others in Abney Park Cemetery, Cannizaro Park, Downhills Park, Golders Hill Park, Osterley Park and Syon Park; a newly-planted tree in Hanger Hill Park.
- Quercus canariensis* Mirbeck's oak. Spain, northern Africa, 1844. Infrequent. Fine examples in Syon Park; an old tree in Osterley Park.
- Quercus macranthera* Caucasian oak. Caucasus, Iran, 1873. Uncommon. Mature trees in Brockwell Park, Springfield Park and Syon Park; young trees in Battersea Park, Central Park, and by Harrow Road (opposite Amberley Road) near Paddington.



FIGURE 8. Old *Quercus suber* cork oak in Littlecote Close, Wandsworth.

Photo: Elinor Wiltshire

Quercus prinus chestnut oak. North America, c.1688. Rare. Syon Park.

Quercus frainetto Hungarian oak. South-eastern Europe, 1838. Infrequent. A tree at Osterley is said to be among the first of the species to be planted in Britain. A magnificent specimen in Syon Park; young trees in Central Park, Hanger Hill Park, Hyde Park and Kensington Gardens.

Quercus pyrenaica 'Pendula' Pyrenean oak. Northern Africa, southern Europe, 1822. Infrequent. A noted specimen in Holland Park.

Quercus petraea sessile or durmast oak. Native. Uncommon in central, occasional in south-east London, frequent in Haringey woods. A tree in Kensal Green Cemetery.

Quercus petraea 'Mespilifolia' a form of sessile oak with irregular narrow leaves. Rare. A tree in Holland Park, another in Osterley Park.

Quercus petraea 'Insecata' ('Laciniata') a form of sessile oak with deeply incised leaves. Woodcock Park.

Quercus bicolor swamp white oak. North America, 1800. Rare. A tree in Kensington Gardens near Marlborough Gate.

Quercus macrocarpa burr oak. Eastern North America, 1811. Rare. A fine specimen in Holland Park.

Quercus dentata Daimyo oak. Far East, 1830. Infrequent. Specimens in Gunnersbury Park, Hampton Court and Osterley Park.

Quercus phillyreoides phillyrea oak (not in Mitchell). China and Japan, 1861. Rare. An evergreen shrub or small tree with oval leaves glossy on both surfaces. In Castle Lane, Victoria.

Quercus × *kewensis* (*Q. cerris* × *Q. wislizeni*) (not in Mitchell). Raised at Kew, 1914. Rare. A small tree with angular semi-evergreen leaves. A specimen in Roe Green Park.

ULMACEAE (elm, zelkova and hackberry family)

Ulmus glabra wych elm. Native. Occasional in London. Mature trees in Battersea and Southwark Parks; two young specimens near The Lido in Hyde Park.

Ulmus × *vegeta* Huntingdon elm. A fine specimen in The Meadow, Battersea Park; also in Southwark Park.

Ulmus pumila Siberian elm. North-eastern Asia, 1860. Rare. An elegant tree near The Meadow entrance in Battersea Park.



FIGURE 9. A winter view of one of the magnificent *Quercus* \times *crenata* 'Lucombeana' Lucombe oaks in West Ham Park.

Photo: Elinor Wiltshire

Zelkova carpinifolia Caucasian elm. Caucasus, 1760. Infrequent. A splendid specimen in College Road, Dulwich; fine trees in Hyde Park, Regent's Park, Springfield Park, Syon Park, and Woodford Road (junction with Meadow Walk) in Snaresbrook.

Zelkova serrata keaki. Japan, 1862. Infrequent. Good examples in Battersea Park, Holland Park, Kensington Gardens (in North Flower Walk), Montpelier Park and Syon Park.

Celtis australis southern nettle-tree. Mediterranean, south-west Asia, 1796. Rare. A tree in Ranelagh Gardens; two young trees in Titchbourne Row off Hyde Park Crescent, Marble Arch.

Celtis occidentalis nettle-tree. North America, 1636. Rare. Fine old trees in Battersea Park, Cannizaro Park and Charlton Park; other examples in the City of Westminster Cemetery at Hanwell and Woodcock Park.

MORACEAE (mulberry family)

Maclura pomifera Osage orange. Central USA, 1818. Rare. A young specimen in Chelsea Physic Garden.

CERCIDIPHYLLACEAE (Katsura family)

Cercidiphyllum japonicum Katsura tree. Japan, China, 1865. Infrequent. Good specimens in Cannizaro Park.

MAGNOLIACEAE (magnolia and tulip tree family)

Magnolia acuminata cucumber tree. North America, 1736. Uncommon. In Cannizaro Park.

Magnolia macrophylla large-leaved cucumber tree, South-eastern USA, 1800. Uncommon. In Cannizaro Park.

LAURACEAE (laurel family)

Umbellularia californica Californian laurel or 'headache-tree'. California, Oregon, 1829. Rare. Resembles bay, but aroma from crushed leaves is said to cause headaches. Fine specimens in Greenwich Park, Gunnersbury Park, Holland Park and Kensington Gardens.

Sassafras albidum sassafras. Eastern USA, 1630. Rare. In Cannizaro Park.

HAMAMELIDACEAE (witch-hazel family)

Liquidambar formosana Chinese sweet gum. China and Formosa (Taiwan), 1884. Very rare. In Battersea Park.

Liquidambar orientalis oriental sweet gum. Asia Minor, 1750. Rare. In Battersea Park, Chelsea Physic Garden and Montpelier Park.

EUCOMMIACEAE (gutta-percha family)

Eucommia ulmoides gutta-percha tree. China, 1896. Rare. A specimen in the Wilderness at Hampton Court; another near the Woolwich Road entrance to Maryon Park.

PLATANACEAE (plane tree family)

Platanus orientalis oriental plane. South-eastern Europe, Asia Minor, India, c.1550. Infrequent. A spectacular example in Osterley Park, planted in 1755. Other sites include Cannizaro Park, Woodcock Park, and Kensal Green Cemetery.

Platanus orientalis 'Digitata' a form with leaves divided into finger-like lobes. A series along Kensington High Street.

Platanus × *hispanica* 'Augustine Henry', a form of London plane. Little-known, but there is a labelled example in St James's Park between The Mall and the bridge.

Platanus × *hispanica* 'Pyramidalis', another little-known form of London plane (not in Mitchell). A specimen planted in 1911 to mark the coronation of George V is in Green Park.

ROSACEAE (rose family)

Crataegus flabellata, a thorn with fan-shaped double-toothed leaves (not in Mitchell). North America, c.1830. Rare. An old tree in Richmond Park, beside Pembroke Lodge.

Mespilus germanica medlar. South-east Europe to Asia, long cultivated. Rare. Eltham Palace, Kensington Gardens, Montpelier Park and St James's Park.

Sorbus domestica true service tree. Native. Rare. Planted specimens can be seen at a variety of London sites, including Cannizaro Park, Fulham Palace Gardens, Rest Garden of Hanwell Community Centre, Holland Park, Richmond Terrace Gardens, Roe Green Park and St Ann's Hospital grounds in Haringey.

S. torminalis wild service tree. Native. Infrequent. Flourishing in Highgate, Queen's and Coldfall Woods: several in Fryent Country Park (Williams 1996); a young planted tree in Hyde Park near the Rose Garden; others in Holland Park.

Lyonothamnus floribundus Catalina ironwood (not in Mitchell). Catalina Island, California. Very rare. A graceful evergreen with shredding bark and entire or toothed simple leaves. A specimen in Chelsea Physic Garden.

Lyonothamnus floribundus ssp. *aspleniifolius* Catalina ironwood subspecies (not in Mitchell). A form with pinnate leaves. Californian islands, 1900. Rare. A specimen in Cannizaro Park.

LEGUMINOSAE (pea family)

Acacia dealbata silver wattle or mimosa. Australia, 1820. Rare in south-eastern England. Specimens in Fulham Palace Gardens and Holland Park.

Gleditsia triacanthos honey-locust. North America, c.1700. Infrequent. Occasional in parks and streets. Fine old trees in Waterlow Park and Kennington Park.

Gleditsia sinensis Chinese honey-locust (not in Mitchell). China, 1774. Rare. Chelsea Physic Garden.

Gymnocladus dioica Kentucky coffee-tree. Eastern and central USA, 1812. Rare. Fine trees in Dulwich Picture Gallery garden and in Finsbury Park near Manor House gate; also in Battersea Park, Cannizaro Park, Greenwich Park, Hanwell Cemetery and Mountsfield Park.

Cladrastis lutea yellow-wood. Eastern USA, 1812. Rare. A tree near Rose Garden in Hyde Park, which flowered in 1995 for the first time in ten years; another in Fulham Palace Gardens.

Cladrastis sinensis Chinese yellow-wood (not in Mitchell). China, 1901. Rare. A tree in Woodland Garden, Bushy Park.

Sophora japonica pagoda tree. China, Korea, 1753. Uncommon. Two very fine trees in York House Gardens. Other sites include Battersea Park, Holland Park, Hanwell Cemetery, Syon Park, and Trinity Road in Wandsworth. A good specimen of

S. japonica 'Pendula' by The Meadow in Battersea Park; others in Gunnersbury Park and Kennington Park.

Sophora tetraptera Kowhai, a shrub or small tree (not in Mitchell). New Zealand, 1772. Uncommon. Good specimens in Cannizaro Park and Sayes Court Park; a small one in North Flower Walk, Kensington Gardens.

Robinia pseudoacacia 'Unifoliola', a single-leaved form of false acacia. Raised c.1855. Rare. Two trees near Bird Sanctuary in Hyde Park; a number of fine trees in Elgin Crescent and adjoining streets near Notting Hill; single trees by Central Park and in Ruskin Park.

Robinia viscosa clammy locust (not in Mitchell). South-eastern USA, 1791. Rare. A small tree with sticky shoots. A specimen in the Wilderness, Hampton Court.

Caragana arborescens 'Pendula' pea-tree (not in Mitchell). Siberia, Manchuria, c.1856. Rare. A small tree with pinnate leaves and yellow flowers. In Cannizaro Park.

RUTACEAE (rue family)

Tetradium daniellii (comprising *Euodia daniellii*, *E. hupehensis* and *E. velutina*) euodia. China, 1908. Rare. Cannizaro Park, Chelsea Physic Garden, Fulham Palace Gardens, Greenwich Park, Hampton Court, Hanwell Cemetery, St James's Park, Kensington Gardens near Orangery, Normand Park, and Queen Mary's Gardens in Regent's Park.

Phellodendron amurense Amur cork-tree. Northern China, Manchuria, 1856. Rare. A fine tree in Central Park, another at Hampton Court; smaller specimens in Cannizaro Park and Chelsea Physic Garden.

Ptelea trifoliata hop-tree. North America, Mexico, 1704. Rare. A mature tree in Regent's Park; a young specimen in Cannizaro Park.

MELIACEAE (mahogany family)

Toona (*Cedrela*) *sinensis* Chinese cedar. China, 1862. Rare. A fine tree in Hanwell Cemetery; a decorative feature in the Rose Garden in Hyde Park.

ANACARDIACEAE (cashew family)

Rhus potaninii, a tree form of sumach (not in Mitchell). China, 1902. Rare. A tree in shrubbery by Bird Sanctuary, Hyde Park.

Pistacia terebinthus Chian turpentine tree (not in Mitchell). Asia Minor, Mediterranean, c.1656. Rare. A specimen in Cannizaro Park.

ACERACEAE (maple family)

Acer platanoides 'Cucullatum', a form of Norway maple with hooded leaf-lobes. Pre-1880. Uncommon. Kensington Gardens, Osterley Park, Victoria Park.

Acer lobelii Lobel's maple. Southern Italy, 1838. Uncommon. Battersea Park, Cannizaro Park.

Acer obtusifolium (*A. syriacum*), a bushy evergreen maple (not in Mitchell). Syria, Cyprus, c.1903. Rare. In Kensington Gardens near Albert Memorial.

Acer monspessulanum Montpellier maple. Southern Europe, western Asia, 1739. Uncommon. In Cannizaro Park, Kensington Gardens, Osterley Park and Ranelagh Gardens; Manor Park Cemetery, Forest Gate.

Acer opalus Italian maple. Central and southern Europe, 1752. Infrequent. St James's Park, Kensington Gardens.

Acer macrophyllum Oregon maple. Western USA, 1827. Infrequent. Three trees in Old Brompton Cemetery by Chelsea Pensioners' monument, one in Regent's Park.

Acer tataricum Tartar maple. South-eastern Europe, western Asia, 1759. Rare. In Cannizaro Park.

Acer diabolicum horned maple. Japan, 1860. Rare. In Syon Park.

Acer triflorum rough-barked maple. Manchuria, Korea, 1923. Rare. In Fulham Palace Gardens.

HIPPOCASTANACEAE (horse-chestnut family)

Aesculus turbinata Japanese horse-chestnut. Japan, c.1880. Infrequent. Four trees in Hyde Park by Triangle car park (opposite Magazine).

Aesculus californica California horse-chestnut (not in Mitchell). California, c.1850. Rare. A specimen of this low-spreading tree in Battersea Park.

Aesculus glabra Ohio buckeye (not in Mitchell). South-eastern and central USA, c.1809. Rare. A fine example in Syon Park.

Aesculus flava yellow buckeye. South-eastern USA, 1764. Infrequent. Two old trees in

Hyde Park north of bridge, referred to by Webster (1920). Other sites include Central Park, Gunnersbury Park, Ravenscourt Park and Syon Park.

SAPINDACEAE (soapberry family)

Xanthoceras sorbifolium (not in Mitchell). Northern China, 1866. Rare. A small tree with pinnate leaves, white flowers and curiously-shaped fruits. An elegant specimen in York House Gardens.

TILIACEAE (lime family)

Tilia americana American lime (not in Mitchell). Eastern Canada and USA, 1752. Rare. A species with large coarsely-toothed leaves. Four trees in Hyde Park near Park Lane.

Tilia mongolica Mongolian lime (not in Mitchell). Eastern Russia, Mongolia, northern China, 1880. Rare. A tree in Cannizaro Park; another in Hanwell Cemetery.

Tilia henryana (not in Mitchell). Central China, 1901. Very rare. Leaves have coarse teeth with bristle-like tips. Three young trees in Hyde Park near Park Lane.

THEACEAE (tea family)

Stewartia pseudocamellia deciduous camellia. Japan, 1874. Infrequent. A tree in Isabella Plantation, Richmond Park.

Stewartia sinensis Chinese stewartia. Central China, 1901. Rare. A tree east of Albert Memorial, Kensington Gardens.

FLACOURTIACEAE (flacourtia family)

Azara microphylla (not in Mitchell). Chile, Argentina, 1861. Rare. An elegant tree-like shrub which can reach a height of five metres in a sheltered situation. Fine specimens in Cannizaro Park and Montpelier Park.

NYSSACEAE (tupelo family)

Nyssa sylvatica tupelo or black gum. Eastern North America, pre-1750. Infrequent. In Cannizaro Park, Chelsea Physic Garden and Fulham Palace Gardens.

MYRTACEAE (myrtle family)

Eucalyptus coccifera funnel-fruited gum. Tasmania, 1840. Rare. A specimen in Hampton Court Arboretum.

Eucalyptus subcrenulata Tasmanian alpine gum (not in Mitchell). Rare. A specimen in Hampton Court Arboretum.

RHAMNACEAE (buckthorn family)

Hovenia dulcis Japanese raisin tree (not in Mitchell). Far East, Himalayas, 1912. Very rare. A small tree with yellow flowers, whose stalks become fleshy and edible. A specimen in Holland Park.

ARALIACEAE (ivy family)

Kalopanax septemlobus (*K. pictus*) prickly castor-oil tree. Far East, 1865. Infrequent. Two fine trees in The Gardens, Greenwich Park. Also a young specimen of *K. septemlobus* var. *maximowiczii*.

ERICACEAE (heather family)

Oxydendrum arboreum sorrel-tree. South-eastern USA, 1752. Infrequent. In Cannizaro Park and at Eltham Palace.

Arbutus × *andrachnoides* hybrid strawberry tree. Occurs wild in Greece, c.1800. Infrequent. A notable example in Battersea Park.

EBENACEAE (ebony family)

Diospyros lotus date-plum. China and Japan to western Asia, 1597. Infrequent. A fine specimen in the Flower Walk and a younger tree near the Orangery, Kensington Gardens. Also in Chelsea Physic Garden and Hanwell Cemetery.

Diospyros virginiana persimmon. China and Japan, 1862. Rare. A specimen in Cannizaro Park.

STYRACACEAE (storax family)

Styrax obassia big leaf storax. Japan, 1879. Infrequent. A specimen in Cannizaro Park.



FIGURE 10. One of the *Fraxinus americana* white ashes on Wandsworth Common, showing the grafted trunk.

Photo: Elinor Wiltshire

Pterostyrax hispida epaulette tree (not in Mitchell). Japan and China, 1895. Uncommon. A young specimen of this shrubby tree in Cannizaro Park.

Halesia monticola snowdrop-tree or silverbell-tree. South-eastern USA, 1897. Infrequent. In Holland Park and Isabella Plantation in Richmond Park.

OLEACEAE (olive family)

Olea europaea olive (not in Mitchell). Mediterranean, long cultivated. Rare. A mature tree in Chelsea Physic Garden; young trees in Gladstone Park and Connaught Square, Marble Arch.

Fraxinus xanthoxyloides Afghan ash (not in Mitchell). Himalayas, Afghanistan, c.1870. Rare. An old tree in Syon Park.

Fraxinus angustifolia 'Veltheimii', a form of narrow-leaved ash. Rare. Three trees in Kensington Gardens resemble two specimens at Kew which were sent in 1889 from Dieck's nursery in Germany.

Fraxinus americana white ash. Eastern North America, 1724. Rare. Several old trees in Hyde Park and Kensington Gardens; two in Central Park, one in Victoria Park near Crown Gates, and two by lake on Wandsworth Common (Figure 10); young trees in Battersea Park and Gladstone Park.

Fraxinus pennsylvanica red/green ash. Eastern North America, 1783. Rare. Fine specimens in Clissold Park, Regent's Park (overhanging the Outer Circle near children's boating pool), and Woodcock Park; three old trees in Kensington Gardens south of Round Pond; a small old tree in Ruskin Park.

Fraxinus velutina Arizona ash (not in Mitchell). North America, 1891. Rare. A young tree in Hyde Park by South Carriage Drive near Hyde Park Hotel, another in Porteus Road near Paddington Station.

Fraxinus latifolia Oregon ash (not in Mitchell). North America, c.1870. Rare. A young tree in Regent's Park near Kent Gate.

SCROPHULARIACEAE (figwort family)

Paulownia tomentosa paulownia or foxglove tree. China, 1838. Infrequent. Abundance of violet blooms before leaves appear make this a striking feature of some London parks, including Battersea Park, Hyde Park, Kensington Gardens, Regent's Park and Royal Victoria Gardens.

BIGNONIACEAE (bignonia family)

Catalpa speciosa northern catalpa. Central USA, 1880. Rare. A noted old tree in Radnor Gardens, Twickenham.

Catalpa × *erubescens* (*C. ovata* × *C. bignonioides*) hybrid catalpa. Indiana, 1874. Infrequent. In Hanwell Cemetery, Kensington Gardens, and occasional at other sites.

Catalpa ovata yellow catalpa. China, 1849. Infrequent. Chelsea Physic Garden, Hampton Court, Kensington Gardens.

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This study was made possible through the kind cooperation of many people associated with London trees, who supplied information, helpful suggestions and comments. The majority are or were concerned with various local authority services in the relevant boroughs, and I gratefully acknowledge help from Paul Akers, J. Alexander, Tony Ash, Derek Austin, Rachel Bagenal, David Bevan, Jeremy Birtles, S. Driscoll, Ian Farquhar, Shaun Faulkner, Kevin Fisher, Clive Fowler, Ian Graham, Ray Harding, Alistair Johnstone, David Jones, Geoff Keers, Usheen Kelly, Dave Lofthouse, Gillian Mobbs, Angus Morrison, Chris Mountford, Keith Naish, Tim Pyall, Mark Pearson, Mark Perkins, A. Pindar, Gavin Simmons, Alistair Smith, Mark Webster, Peter White, Leslie Williams and D. A. Woodgate. Information about trees in the Royal Parks was kindly provided by Jane Braham, Nick Butler, Dennis Clarke, Paul Kitson, Simon Richards, Theresa Short and J. Woodcock. Thanks are also due to Graham Dillamore (Hampton Court), Kevin Mills (Osterley Park), Sue Minter (Chelsea Physic Garden), Gerald Morgan (Royal Hospital Chelsea), Alan Richardson (English Heritage) and F. A. Woodcock (Syon Park). J. L. S. Keesing (Royal Botanic Gardens) provided valuable information about comparable trees at Kew and Allen Coombes (International Oak Society) identified puzzling oaks. Useful suggestions and information were contributed by Peter Bourne, Rosa Davis, Alan Harrington, Brian Mist and Nigel Muir. For historical material regarding sites I am grateful to Local Studies libraries in Camden, Cricklewood (Bridget Keane), Ealing (Ann Terre), Haringey (Rita Read), Kensington & Chelsea, and Westminster, and to St Ann's Hospital, Haringey (Mrs V. M. Bramley). I thank Douglas Kent and Sylvia and Julian Reynolds for reading the manuscript and for their useful comments. Despite generous assistance in preparation of this paper, errors, omissions and misunderstandings may have occurred, and are the responsibility of the author.

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Book review

Flora of Ashdown Forest. Tim Rich and eleven others. Sussex Botanical Recording Society. 1996. 256 pp. £19.50 post free. ISBN 0 9522987 1 6.

Although there are twelve authors listed on the title page and copyright statement, it is clear that much of this flora is the work of Tim Rich. Not only are the obsession with bears and the frequent references to works on hay fever, including his own, giveaways, but there is also the opportunity to put into practice ideas he has expressed elsewhere about the importance of uniformity in recording if the result is to be a statistically reliable statement of geographical distribution of the plants recorded in a given area. So for this area, divided into seventy-one 1-km squares, we are told which of the recorders visited which squares, the total number of hours spent recording in each square and so on. Recorders were in part directed to particular squares and most squares were visited by several different recorders (mean 6.5), so that for instance the squares identified as having a below-average proportion of grass species recorded cannot be related to the weakness of any individual. Given the overall intensity of recording and the small area to be covered, the result is a far more convincing picture of the distribution of plants in Ashdown Forest than could be garnered from a careful study of the *Sussex plant atlas* (Hall 1980). Tim would have us believe that his principles could equally well be applied to national survey schemes, but the conditions in which they have to operate are a lot further from the ideal.

The compactness of the area covered also has the result that in a book of A4 size and reasonable thickness it is possible to fit up to five species to a page, and still treat each one adequately and those which are of particular interest very fully. It is warmly recommended.

RODNEY BURTON

Towards a 'common plant census' to monitor environmental change

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Contents

Abstract	67
Introduction	67
Methods	68
Results	70
Discussion	74
Acknowledgements	76
References	76

Abstract

Apparent responses of some plants of neutral grasslands to year-to-year climatic and other influences were noted during investigations of management treatments in hay meadows at Fryent Country Park, Middlesex from 1985 to 1996. The suggestion is made that data from this and from other sites could be collated as part of a regional 'common plant census', to complement the long-established United Kingdom schemes for monitoring species of birds and butterflies.

Introduction

In the United Kingdom, national schemes for the annual monitoring of the abundance of birds and of butterflies have been in operation for many years. At a time when the possible effects of climatic change and of global warming on the Earth's vegetation is the subject of speculation, it may be opportune to consider the feasibility of a complementary scheme for plants. This paper comments on some aspects of the idea of a regional or national plant census, using as an illustration data from a selection of species monitored at Fryent Country Park.

The Common Birds Census was established in 1962 and involves the annual monitoring of breeding birds in farmland and woodland plots throughout the United Kingdom (Marchant 1983, Baillie 1991). The Butterfly Monitoring Scheme commenced in 1976 and now covers over eighty sites (Pollard, Hall and Bibby 1986). Both schemes use the annual quantitative data on species abundances at each site. The methodology for the schemes are standardized throughout the country, and from year to year, as is the analysis of the local results and of the compilation of national indices. The schemes rely largely on fieldwork undertaken by volunteers and by nature reserve staff. Whilst both schemes have limitations, these have been discussed by, e.g., Pollard, Hall and Bibby 1986, Pollard 1991, Pollard and Yates 1993, Baillie 1991, and Dawson 1985). The butterfly scheme, for example, has a high proportion of transects confined to nature reserves, rather than being representative of the countryside as a whole, or of urban areas. A number of butterfly transects operate independently of the national scheme, though using the same method (Hall 1981), and thus are statistically compatible.

Effects due to habitat and environmental change on the recorded species have been noted by both schemes. The Common Birds Census has highlighted

the effects of agricultural chemicals, the loss of hedgerows and of other farmland habitats and the effect of harsh winters on adult mortality (O'Connor and Shrubbs 1986). The Butterfly Monitoring Scheme has highlighted the effects of year-to-year climatic variation on butterfly populations (Pollard, Hall and Bibby 1986), and the effects of habitat change such as of grassland management (Butterflies Under Threat Team 1986), and the possibility of other factors (Pollard, Moss and Yates 1995).

There is no similar scheme to monitor changes in the annual abundances of plant species. National recording is based on surveying the presence, and possibly at a later date, changes in the presence of species, in ten-kilometre squares (Perring and Walters 1962), and at the county level, in two- (tetrad) or one- (monad) kilometre squares of the National Grid. A resurvey of selected tetrads (2×2 km squares) in some of the 10-km squares, to be used in the future to detect changes in the national flora, has been organized by the Botanical Society of the British Isles (Ellis 1986, Rich and Woodruff 1990). Since January 1992, the Natural Environment Research Council has established the UK Environmental Change Network at several government establishments (Natural Environment Research Council 1994). The aim is to maintain a suite of sites from which to obtain comparable long-term data sets measuring variables of environmental importance.

Evidence for climatic change due to global warming and the 'greenhouse effect' has been discussed by, e.g., the Countryside Commission (1995). It is not the purpose of this paper to repeat that discussion. However, even slight changes in climate may have implications for agriculture, industry and commerce including insurance and financial services, e.g., Mansley (1994). For example, the plant growing season could increase by several weeks together with a corresponding reduction in the period of winter dormancy.

Much monitoring of vegetation is undertaken as part of long-term research projects, for example, into the effects of habitat management on nature reserves. In such investigations of vegetation dynamics, it is important to portion any variability into its components (Austin 1981). In addition to the main effects under investigation (e.g., management treatment), other factors which affect the vegetation could include climatic fluctuations, cyclic changes, successional trends, ground disturbance, and random events. Hellawell (1991) suggested that there are, broadly, three kinds of intrinsic changes in vegetation: successional, stochastic and cyclical. Successional changes need no introduction here. Stochastic events include the unpredictable, such as floods, droughts and, in the context of this paper, climatic change. Cyclical changes include predator-prey and density-dependent interactions.

The aims of this paper are to highlight climatic and other trends in the frequencies of plants observed during the monitoring of grasslands, and to suggest that similar data from other sites could be collated in the form of a common plant census to monitor climatic change.

Methods

Data used in this paper were obtained from neutral hay meadow grasslands monitored at Fryent Country Park, Middlesex, from 1985 to 1996. That investigation was primarily concerned with the effects of management treatments on the grassland vegetation. For the purposes of illustrating a 'common plant census' it was considered desirable that the data used were from fields which were initially as homogeneous as possible in management treatment and vegetation type. Records were maintained of the management treatments applied to each of twenty-six fields, and National Vegetation Classification (Rodwell 1992) types were estimated from the data obtained during the first two years of the investigation, and from Hare (1988). Seventeen of the twenty-six fields, all on the east side of the Country Park, appeared to be of

Mesotrophic Grassland 1 (MG1). These were cut, approximately once a year, usually for hay. The slight variations in management treatment (e.g., in some years a small proportion of the fields was left uncut, or was flail cut without harvesting of the hay) did not appear to obscure variations in species frequencies due to non-management treatment factors. All had a recent history of hay harvesting in the years prior to 1985. One field (Pages) was not surveyed in 1985.

Annual monitoring was undertaken in each field to obtain the frequency of the grassland plant species where frequency was defined by Curtis and McIntosh (1950) as:

$$\frac{\text{Number of quadrats in which a species occurs}}{\text{Total number of quadrats examined}} \times 100\%$$

Ten 1 km² quadrats were used in each field, except in the first year, 1985, when twenty quadrats were used per field as suggested by Duffey et al. (1974). Ten was a statistically small sample size per field, but a balance had to be achieved between the theoretical aspects of sampling and the time available to sample all the fields within the target dates of 15–30 June. Nevertheless, this constituted a total of 320 quadrats (16 fields \times 20 quadrats) in 1985 and 170 quadrats (17 fields \times 10 quadrats) in each of the subsequent eleven years. Quadrat positions were determined by stratified sampling as described by Yates (1960) and Scherrer (1985), with sampling in each sub-area. The use of random coordinates for random sampling would have been impractical. Each field was divided approximately into ten sub-areas and a marker was thrown in each, avoiding the hedgerow edges and other atypical features. The quadrat was placed on the north-west corner of the marker, with the sides of the quadrat squarely in the line of the four cardinal points. The species present in each quadrat were recorded. Shoot frequency, rather than rooted frequency, was used. Species present in atypical features only, for example, on footpaths or on recently disturbed ground, were recorded as present only. Hedgerow edge plants were not listed unless they were potentially part of the hay crop.

At Warrens field, a Latin square* experiment from 1989 to 1994, investigated the effect of three management treatments on neutral hay-meadow grassland. It was designed as a 3 \times 3 Latin square, and within each of the nine blocks, there was a buffer zone enclosing a grid of 10 \times 10, 0.25 m² quadrats. In 1989, twenty 0.25 m² quadrats were selected at random from the 100 squares available. In 1990 the first twenty quadrats were resurveyed, plus a further twenty selected at random. In the third year, the second set of twenty quadrats was resurveyed and a third set selected at random and surveyed, and so on. Average frequencies for each species and the species richness were estimated from the quadrats in each block. The data used in this paper were from that block which was under hay harvesting management in the years immediately preceding and throughout the experiment.

The frequency records of each species in the monitored fields and in the Latin square investigation were examined for evidence of fluctuations which did not appear to be due to management treatments or of possible successional trends in the grasslands. It was possible to comment only on the grassland data, since no systematic comparison of particular weather data with vegetation data had been feasible. However, rainfall data were collected throughout the investigation at Kingsbury, Roe Green Park (station no. 246850), approximately one

*A Latin square is an experimental layout, widely used in agricultural and industrial trials, in which it is possible to compare statistically the effects of the main treatments under investigation, and of additional factors at the same time. The layout has an equal number of rows and columns, equal to the number of main treatments, and constructed so that a particular treatment occurs once only in each row and column (Fowler and Cohen 1990).

kilometre from the Fryent Country Park grasslands, by the method described by the Meteorological Office (1992). The pattern there appeared to be similar to the general pattern elsewhere in south-east England (e.g., Brown 1992).

Results

Over 200 species were recorded during the monitoring of the twenty-six fields on neutral grassland at Fryent Country Park, from 1985 to 1996. Although the frequency of many species may have been affected by cyclic or climatic events, it was only for a few species that the fluctuations were sufficient to appear obvious from a review of the data. In other cases, the extent to which a species may have been affected by climatic variations was less than that of management treatments, succession or disturbance. In the following account, scientific names follow Stace (1991).

The species which appeared to show climatic or cyclical changes, that could not be ascribed solely to management treatment or successional effects, were *Ranunculus acris* meadow buttercup, *R. repens* creeping buttercup, *Vicia hirsuta* hairy tare, *V. tetrasperma* smooth tare, *V. sativa* common vetch, *Trifolium dubium* lesser trefoil, *Geranium dissectum* cut-leaved cranesbill, *Poa trivialis* rough meadow-grass and *Alopecurus geniculatus* meadow foxtail (Figures 1–9). The two buttercup species, *Ranunculus acris* and *R. repens*, appeared to increase and decrease in frequency in synchrony with each other and as part of a cycle (Figures 1 and 2). The cycles appeared to be independent of any obvious climatic events and approximately seven to eight years from high to high.

Five annuals, *Geranium dissectum*, *Trifolium dubium*, *Vicia hirsuta*, *V. tetrasperma* and *V. sativa* (Figures 3–7), all had relatively high frequencies in 1991, 1992 and 1996. Some had increased in 1990 too. Note that for *T. dubium*, it is considered that successional effects were involved in the overall decline in frequency, from the high in the mid 1980s (Figure 4). For *Poa trivialis* an effect was noted, which if not part of a cycle, would suggest a decline during the period from 1989 to 1992 (Figure 8). *Alopecurus geniculatus* had a relatively high frequency in 1989 (Figure 9).

The Latin square experiment was of a shorter duration than that of the monitoring, and the ability to detect any long-term changes was limited. However, there was weak evidence of the *Ranunculus acris* and *R. repens* cycles. *Trifolium dubium* reached a high in 1992, *Vicia hirsuta* in 1991 and *V. sativa* in 1992 (Table 1). The frequencies of *Poa trivialis* showed a similar pattern to that in the monitored fields. For grass species as a whole, there was a reduction in the grass species richness for the years 1990 to 1993 (Table 2).

TABLE 1. Frequencies (%) of species in 0.25 m² quadrats in Warrens field, Fryent Country Park, Middlesex, 1989–1994. Results for grassland under hay harvesting management throughout the experiment. Results from twenty quadrats in 1989 and the average of two sets of twenty quadrats from 1990 to 1994.

Species	1989	1990	1991	1992	1993	1994
<i>Ranunculus acris</i>	95	70	33	63	88	98
<i>Ranunculus repens</i>	100	95	90	60	68	48
<i>Trifolium dubium</i>	5	0	0	8	5	0
<i>Vicia hirsuta</i>	0	60	98	93	53	12
<i>Vicia sativa</i>	0	98	93	100	20	58
<i>Poa trivialis</i>	90	40	23	45	95	100

TABLE 2. Average species richness per 0.25 m² quadrat of all grass species in Warrens field, Fryent Country Park, 1989–1994. Results for quadrats as described for Table 1.

	1989	1990	1991	1992	1993	1994
Species richness	5.45	4.20	4.83	4.35	4.78	5.38

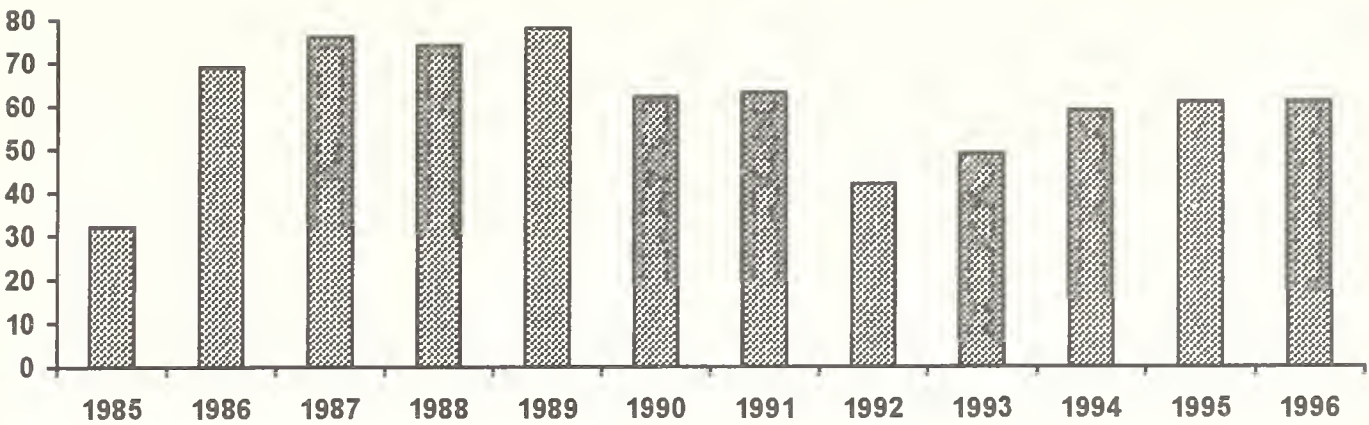


FIGURE 1. Frequencies of *Ranunculus acris* in 1 m² quadrats in hay meadow grasslands at Fryent Country Park, Middlesex, 1985–1996.

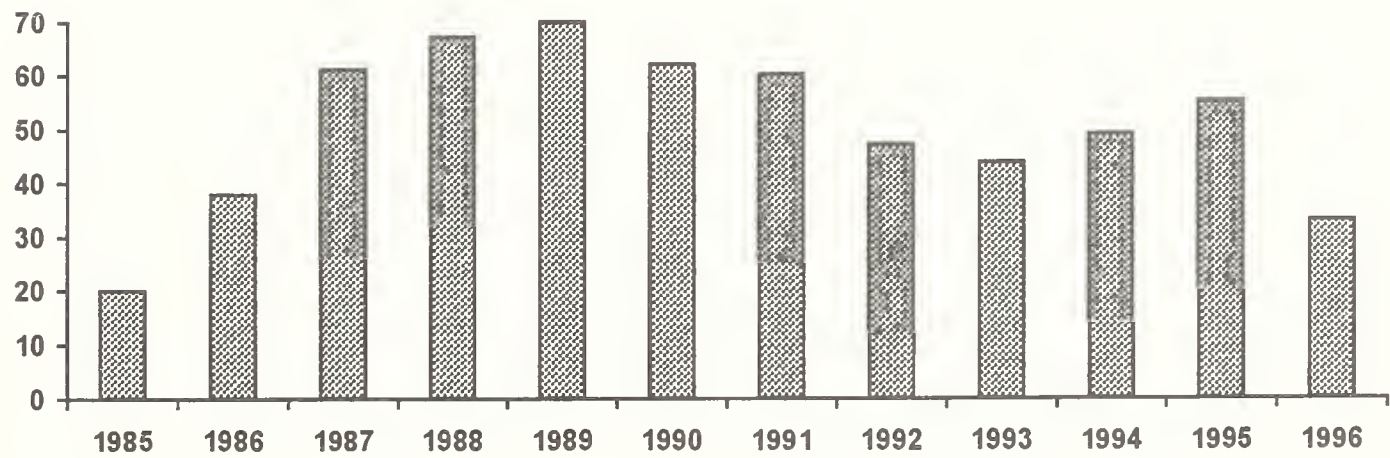


FIGURE 2. Frequencies of *Ranunculus repens* in 1 m² quadrats in hay meadow grasslands at Fryent Country Park, Middlesex, 1985–1996.

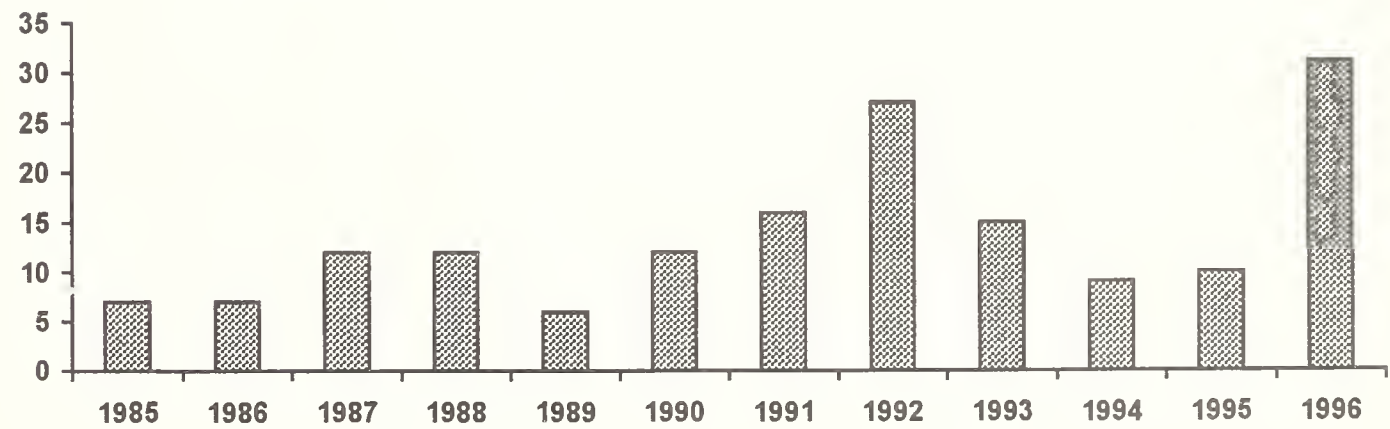


FIGURE 3. Frequencies of *Geranium dissectum* in 1 m² quadrats in hay meadow grasslands at Fryent Country Park, Middlesex, 1985–1996.

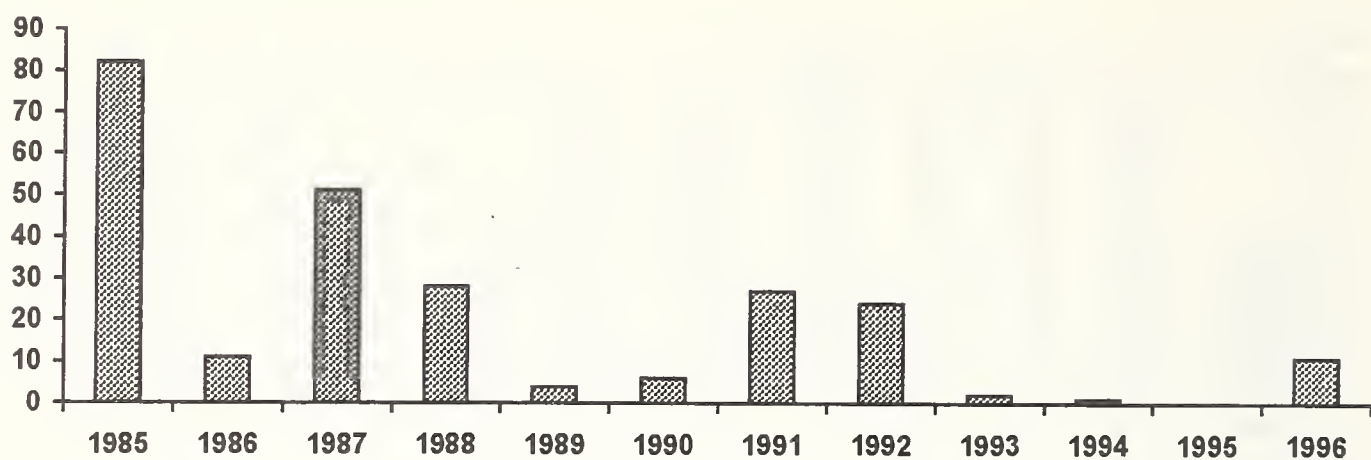


FIGURE 4. Frequencies of *Trifolium dubium* in 1 m² quadrats in hay meadow grasslands in Fryent Country Park, Middlesex, 1985–1996.

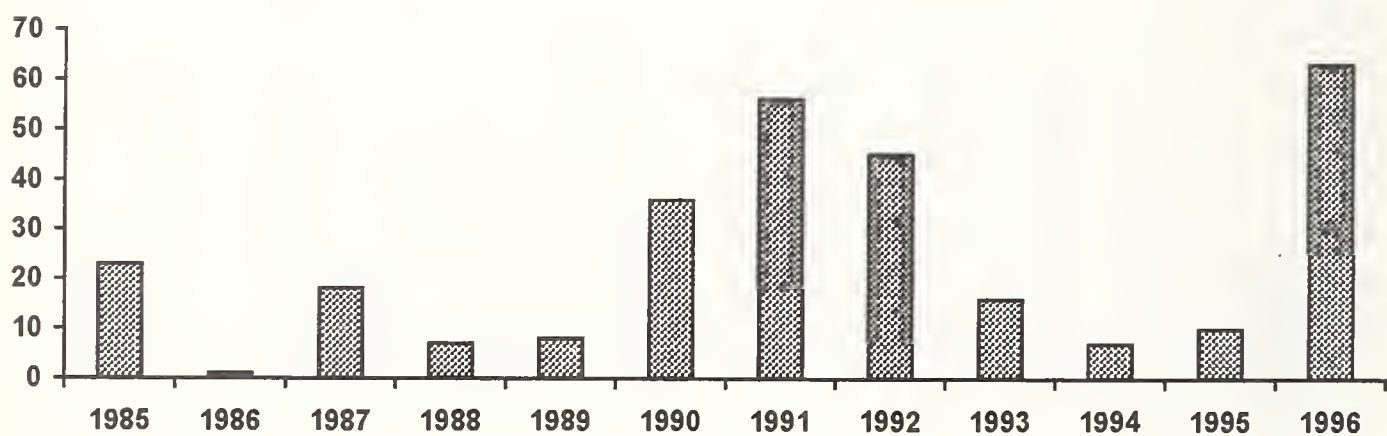


FIGURE 5. Frequencies of *Vicia hirsuta* in 1 m² quadrats in hay meadow grasslands at Fryent Country Park, Middlesex, 1985–1996.

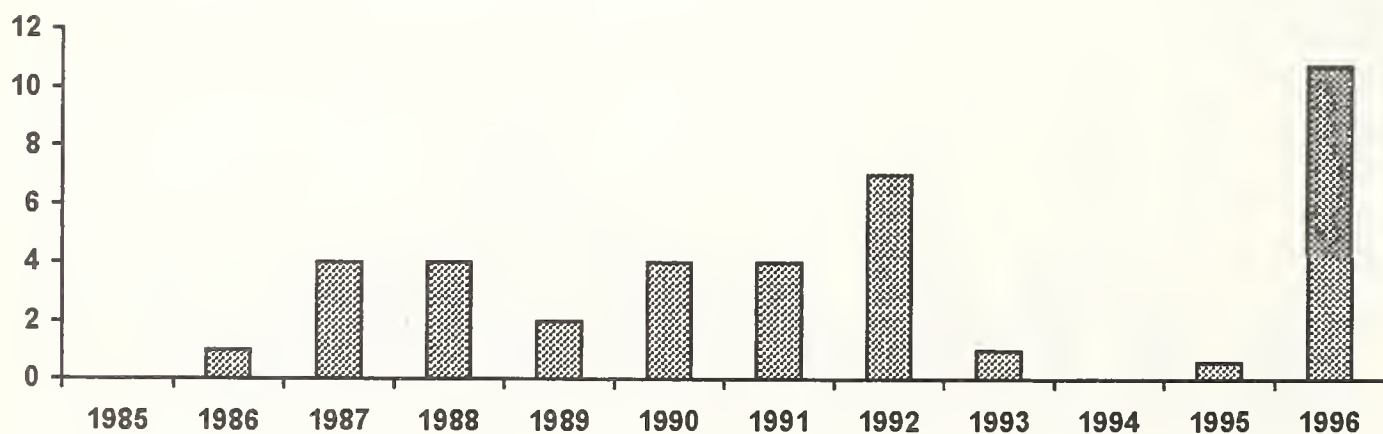


FIGURE 6. Frequencies of *Vicia tetrasperma* in 1 m² quadrats in hay meadow grasslands at Fryent Country Park, Middlesex, 1985–1996.

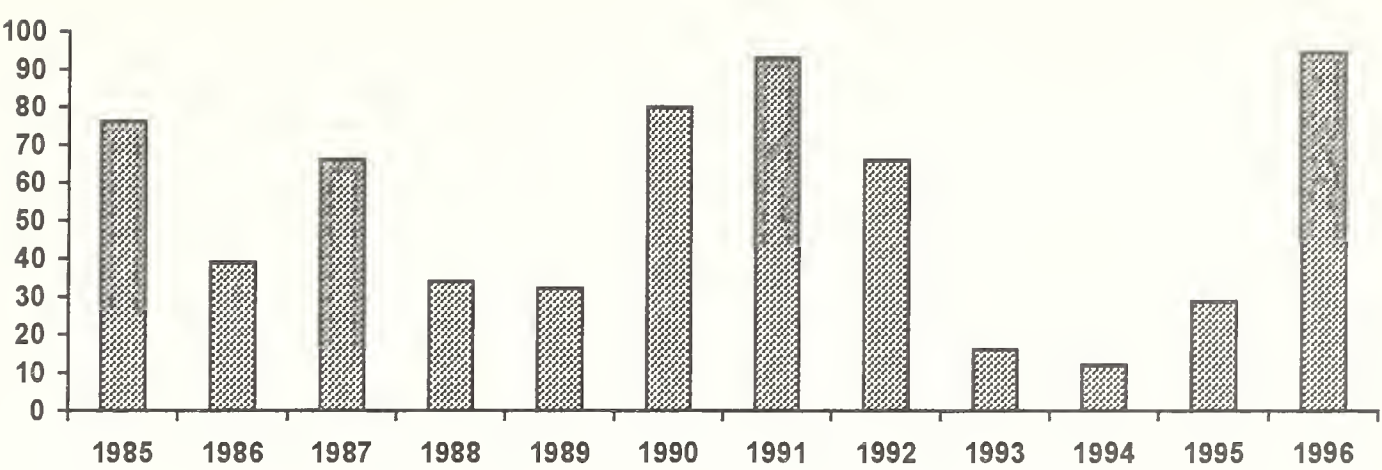


FIGURE 7. Frequencies of *Vicia sativa* in 1 m² quadrats in hay meadow grasslands at Fryent Country Park, Middlesex, 1985–1996.

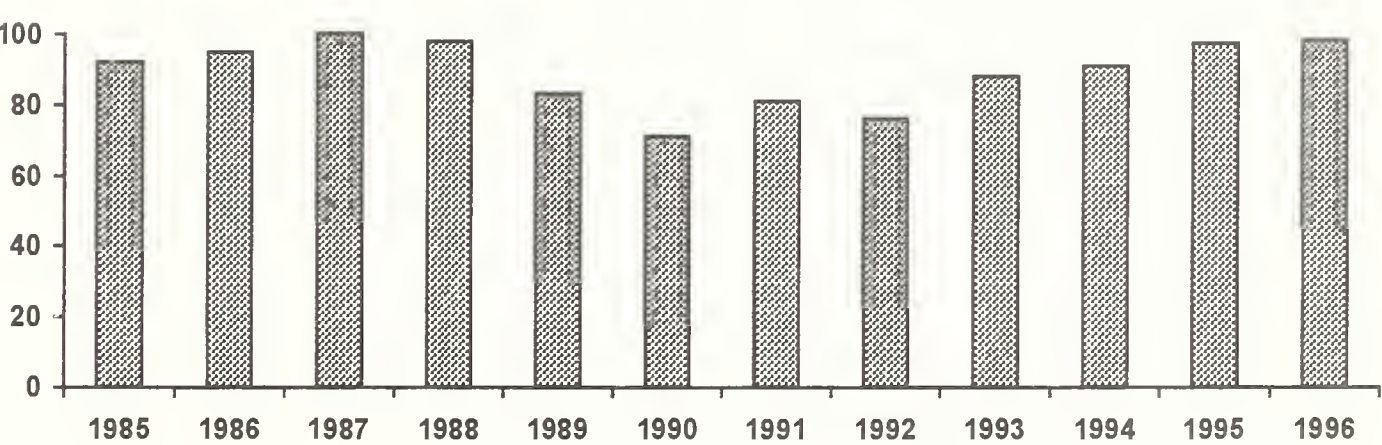


FIGURE 8. Frequencies of *Poa trivialis* in 1 m² quadrats in hay meadow grasslands at Fryent Country Park, Middlesex, 1985–1996.

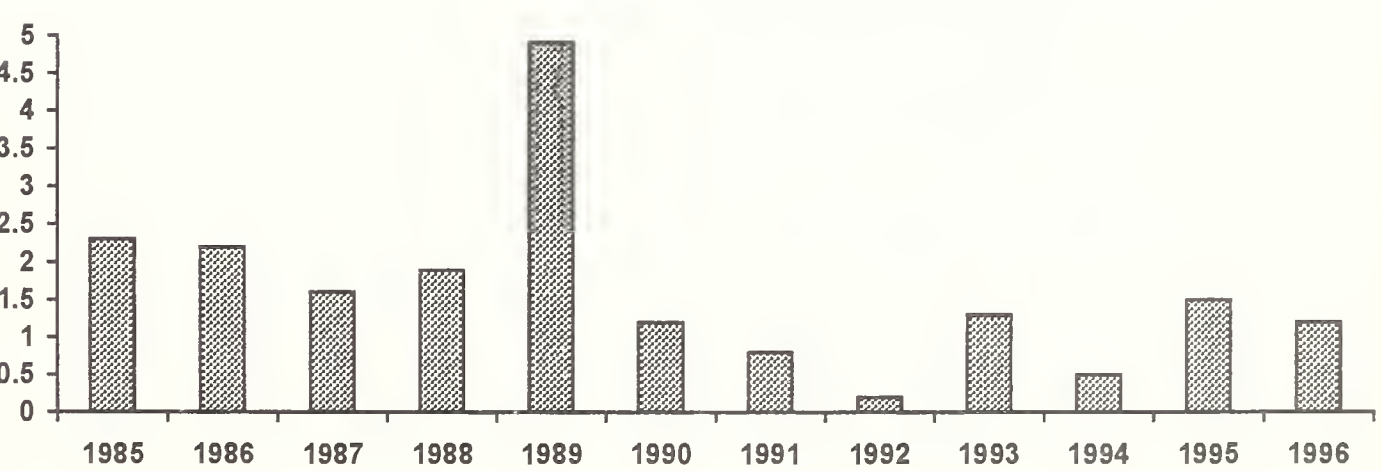


FIGURE 9. Frequencies of *Alopecurus geniculatus* in 1 m² quadrats in hay meadow grasslands at Fryent Country Park, Middlesex, 1985–1996.

Discussion

The cycles shown by the frequencies of the two *Ranunculus* species suggest a comparison with Crothers (1991) who found evidence for a similar cycle for several grassland species including buttercups (mainly *R. repens*?) at Nettlecombe Court, Somerset from 1968 to 1990. Crothers (1991) was unable to obtain any consistent correlation in a comparison with meteorological data. It should be noted that for the years in which the two investigations overlapped (1985–1990), the Somerset and Middlesex cycles were apparently in synchrony. If they were part of the same cycle, the combined results, using *R. repens*, from 1969 to 1995 would suggest an approximately eight to nine year cycle with lows in 1969, 1977, 1985 and 1993, and highs in 1972, 1981 and 1987/88/89. Sarukhan and Harper (1973) found that there appeared to be an element of density-regulation in populations of *R. repens* and *R. acris*, albeit in a thirty-month study where individual plants were mapped and recorded every few weeks. This may offer a clue to the cyclic pattern.

Of the other seven species, the variation in annual frequencies is suspected to be related, at least in part, to variations in year-to-year climatic conditions. As discussed below, elucidating which climatic factors, or combinations of factors, are important to each species and at which stage/s in their life cycle is not easy. A weakness of this paper is that only subjective comments have been made as evidence of such links. Nevertheless it should be feasible for a network with better resources, e.g., the London Natural History Society regionally, or the Environmental Change Network nationally, to obtain a comprehensive set of climatic data from the Meteorological Office and to run this together with plant data in a multivariate or other computer programme.

For *Alopecurus geniculatus* marsh foxtail, wet conditions in the recent preceding years could have resulted in the relatively high frequency in 1989. The changes in the frequency of *Poa trivialis* rough meadow-grass in the monitored fields, and of the grass species richness in the Latin square experiment, suggested that some grasses decline during warm and/or dry periods. Rosen (1990), during an investigation using permanent plots on limestone grassland in Sweden from 1969 to 1987, reported that grasses decreased and annual plants increased after periods of extreme drought.

Of the five annuals, *Geranium dissectum* cut-leaved cranesbill, *Trifolium dubium* lesser trefoil, *Vicia hirsuta* hairy tare, *V. tetrasperma* smooth tare and *V. sativa* common vetch, the four legume species all increased rapidly in the late 1980s to reach a peak in the early 1990s in both the monitored fields and in the Latin square investigation. The increase in the frequency of the annual legumes and the decrease in the frequencies of some grasses may have been related to the events of late 1988 to mid 1992 of below average rainfall and above average temperatures throughout south-east England. A drought commenced in late 1988 and in the winter of 1988–9 rainfall was only 55 per cent of the 1941–70 average (Brown 1992). In the winter of 1991–2, rainfall was only 35 per cent of the 1941–70 average. This period was also characterized by mild winters, e.g., in 1988–9 the mean temperature exceeded the 1941–70 average by 2.7°C, and by warm summers, e.g., in 1989 and 1990.

Preston (1985) noted that annual species of *Lathyrus*, *Trifolium* and *Vicia* are characteristic of plant communities in the Mediterranean lowlands, but some extend to the British Isles, the northern limit of their distribution. Martin and Frost (1980) found that there were large, climatically related variations from year to year in the population sizes of *Trifolium molinerii* and of other annual legumes at the Lizard Peninsula, Cornwall. Similar fluctuations in the abundance of annual plants have been noted by Symonides (1988); and in Mediterranean pasture (Espigares and Peco 1995) and Mediterranean 'dehesa' grassland (Figueroa and Davy 1991).

Clearly, there will be a lag period between the onset of favourable or

unfavourable weather conditions, and the resultant change in the population of a species. For annual species the change may be recorded during the next annual monitoring. If the conditions persist for more than a year, the change in population may be amplified by affecting the reproduction and establishment in the second year's population, and so on. The high frequencies of the two *Vicia* species in the Latin square experiment in 1990, which followed the absence of any records in 1989, suggested the presence of a buried seed bank which responded to the more favourable climatic conditions. Effects could be complicated by environmental conditions affecting the plant at any stage during the annual life cycle, e.g., mean temperatures, seasonal temperatures, the day length, the length of the growing season, frost and the availability of water (Martin and Frost 1980, Espigares and Peco 1995). Each species will respond to climatic conditions differently and there is no uniform pattern of seasonal or long-term dynamics common to all species (Symonides 1988), though temperature is considered to be important. Perennials are also affected by longer-term changes, but tend to be less affected by year-to-year climatic variations than for annuals which generally complete a life cycle, in one year.

Cannell and Hooper (1990) highlighted two fundamental problems in detecting such vegetation change; first, the separation of significant directional change from background fluctuations; and, second, the identification of the cause/effect relationships. In this context, analysing the weather can be complex. White and Lindley (1976) used principal component analysis to identify the main components of the weather. They found that 81–93 per cent of the total variation in the weather data from one station was accounted for by five components. In general, the first component expressed temperature, the second dampness, the third windiness and the fourth snowfall. Some instability resulted in the components from wind direction and speed. Another approach could be that of 'growing days' as used in agriculture (Ministry of Agriculture, Fisheries and Food 1964), or of 'degree days'. For example, in both 1989/90 and 1990/91 the aggregate of the number of degrees Celsius that the average daily temperature was below 15.5°C for each day of the year, was less than the twenty-year average in all seventeen recording regions in the United Kingdom (Energy Efficiency Office 1995). Or use could be made of biological indicators: Jongman et al. (1987) pointed out that the species composition of a plant community may be a more informative indicator of the environment than any given set of measured environmental variables. Monitoring changes in the abundances of species may prove to be a useful indicator of indeterminable abiotic factors.

All species are affected by climatic changes to some extent, and the spatial pattern in the vegetation of the British Isles is influenced by climatic variables. Cannell and Hooper (1990) suggested that, if the 'greenhouse effect' due to atmospheric pollution were to occur, a likely consequence in the United Kingdom would be an expansion of species with a predominantly Mediterranean distribution, recession of species with a northern distribution, extension of lowland species to higher altitudes; and the retreat of upland and montane species.

The annual effect of climate on tree growth over long periods has, of course, formed the basis of dendrochronology, and of its subdiscipline of dendroclimatology which is concerned with the relationship between the environment and tree growth, and with the reconstruction of past environmental conditions from tree-ring data (Dean 1986). The effect of temperature changes over the past 300 years on the recruitment of Scots pine, and that the recruitment peaks lagged warm periods by twenty to thirty years has been noted by Zackrisson et al. (1995). Written, diary events, such as the first dates of observations of annual phenological events over two centuries, from 1736 to 1947, whilst not without limitations, have enabled comparison with climatic variables (Sparks and Carey 1995). The effect of temperature on the timings of first flowering of 243 plant species at Chinnor, Oxfordshire, during the thirty-six years between 1954 and

1989, have shown that there was a general relationship between the temperatures of preceding months and the first flowering date for most of the species (Fitter et al. 1995).

The data from the results at Fryent Country Park, together with those of Crothers (1991), Rosen (1990) and Martin and Frost (1980), suggest that the synchrony of changes in abundance of plant species in response to changes in climate could be monitored at sites throughout a region or country. A common plant census could draw upon existing survey and monitoring schemes, though there may need to be some standardization of methodology and/or of analysis, for example, see Rich and Woodruff (1990), Braae and Nohr (1985), Crawford (1991), Greig-Smith (1983), Goldsmith (1991), Hutchings (1991), Jeffers (1978, 1979), Kennedy and Addison (1987), Kirby et al. (1986), Moss (1985), O'Connor and Shrubbs (1986), Pollard (1991), Scherrer (1985), Taylor (1985), and Yates (1960). Distinction will have to be made between those changes in plant abundance due to site-specific factors, especially management treatment, but including succession, and those changes due to cyclic or climatic events. Usher (1991) mentioned that it is possible that Britain as a whole is too large for single national index values to be of use. Leach (1995) has noted synchronous effects on grasslands in Sites of Special Scientific Interest in south-west England and has floated the idea of a 'Common Plant Census'. It may be opportune to consider establishing such a scheme.

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Life on the edge — a caution on the precise demarcation of Watsonian vice-county boundaries in the London Area

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Summary

In response to an article recently published in this journal (Burton 1994) on the position of Watsonian vice-county boundaries in the London Area, this anecdote is offered regarding a short stretch of one such boundary in south-east London, and a note of caution is appended.

It used to be very straightforward. Having lived in the area for several years, I knew when we moved into our present house that the old vice-county boundary between Surrey and Kent passed very close by. I was fairly convinced that it followed the curve of the next road, or the line of the disused railway beyond and that I was just inside Surrey, by a couple of hundred feet. It didn't really matter; Nunhead Cemetery, which I visited regularly, was definitely in Surrey, and Bromley, where I found beetles in my mother-in-law's garden, was definitely in Kent.

Everything was calm and ordered until one day whilst jabbering on the telephone, I leaned out of my study window and noticed an old round-topped cast-iron boundary post at the end of my next-door neighbour's garden. I could clearly make out the raised letters up its fifty-centimetre height — WISHAM. My jaw dropped as I suddenly remembered that, historically, Lewisham was in Kent. It seemed a bizarre coincidence that this frontier, long since rendered irrelevant to local government, but quite important to me because of its significance in biological recording, should run past my own backyard.

This quirk of fate might have remained little more than a curious aside, but for the fact that I recently found some insects in my house and garden worth recording and indeed worth publishing. Having composed and mailed the short notes, I thought to pore over an old map of the area whilst celebratory coffee cooled. But my ordered world was thrown into confusion.

The Brockley map (surveyed 1863–8, engraved 1869, published 1871) showed Nunhead as it was before the encroachment of housing development. Nunhead Cemetery was laid out and a few roads nearby were shown dotted. Otherwise all around were hedgerows and meadows. A few were marked 'brick field' in anticipation of the Victorian housing boom which was about to hit the area. My road was not marked, but I could guess which field it would be built in — the one with two boundary posts. Hold on, which then was the post still standing in next door's garden? It was impossible to tell.

The Surrey/Kent boundary appeared to do a strange thing as it passed by here. Having carefully followed the meandering line of ancient field edges and hedgerows it suddenly darted away with unnatural geographic purpose. After dodging across the railway at a right angle it veered across the fields in a dead straight line to a post in the middle of nowhere then charged back equally straight to the hedge at a position marked by a second post. In effect an apparently random rectangle of land 500 by 200 feet had been excised from the Surrey parish of St Giles Camberwell and given to the Kent parish of Lewisham, and I was possibly living inside this contentious rectangle. It now became vitally important to know which post still remained next door. If it was the north-westerly one then I lived in Surrey as I always suspected; if it was

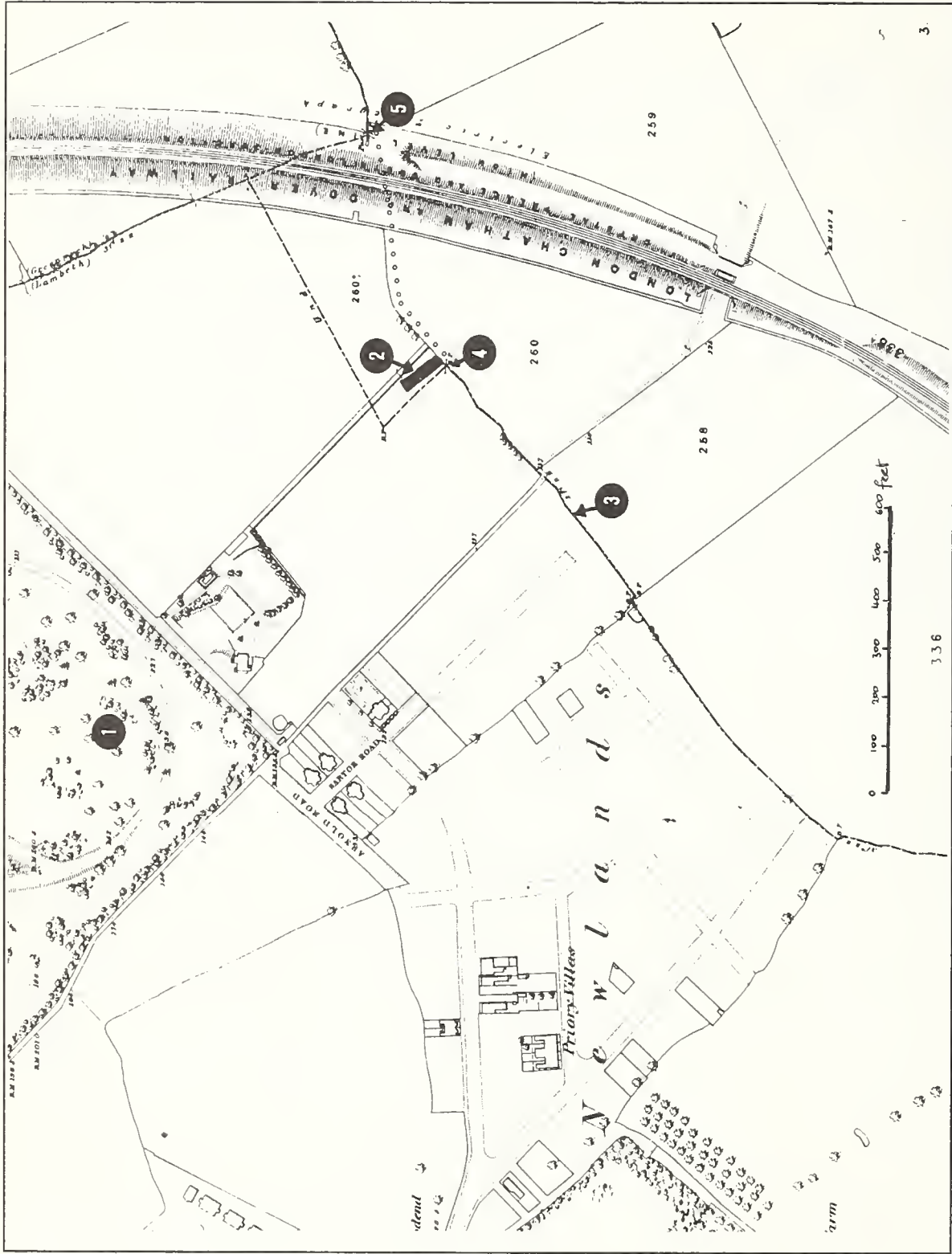


FIGURE 1. Section of the 1868 Brockley map showing the area just south of Nunhead Cemetery. Key: 1 Nunhead Cemetery; 2 current position of my house and garden; 3 line where both parish and county boundaries coincide; 4 boundary post still standing in my neighbour's garden at which point the parish boundary turns left, but the county boundary (highlighted by o o o o o) continues along the hedge; 5 point at which the two boundaries coincide again. Where the parish boundary crosses the field in a dead straight line, 'Und.' indicates that the boundary is undefined, i.e., there is no visible structure such as a hedge on the landscape.

the south-easterly one then I lived in Kent, worse, parts of my garden might be in each county.

At Southwark's Local Studies Library, in Borough High Street, I was recently able to examine maps of the area drawn up in 1916. I discovered, to my amazement, that my house does indeed lie in this misappropriated plot. I must therefore be living in Kent, by ten feet!

After busily informing various folks, another geographical spanner was then thrown into the works. I noticed on an earlier map of 1844, that precisely where I live, the parish and county boundaries did not coincide for a stretch of about 500 feet. The scale of the map was quite small and detail difficult to make out, but it looked as though the part of the field in question, which had come under the domain of the Kent village of Lewisham, still remained as part of Surrey. Confused? Well I certainly was.

Luckily, I was able to seek the advice of a local historian who coincidentally had a London map dated 1858, just the time from which the current vice-counties are taken. It showed that the Surrey/Kent border carefully followed the line of the hedge all the way, without following the deviation that the parish boundary took. I was in Lewisham, but I was in the two and a quarter acres of Lewisham that were in Surrey. After all that, I was back in Vice-County 17, Surrey.

Watson's original vice-county boundaries were those in place on the publication of his *Cybele Britannica* (1852–1859), and theoretically follow the boundaries as they were before the Local Government Act of 1888 changed many of them. The Ray Society maps and accompanying text by Dandy (1969) are on a scale far too small to be of use in London and the descriptions can be confusing. Dandy states that Surrey includes the south-western part of London while Kent includes the south-eastern part. Some have thought this to agree with the modern SW and SE postal districts, a trap I almost fell into myself, but this is not the case.

A recent article in this journal (Burton 1994) highlighted some of these old boundaries, taken from a set of one-inch Ordnance Survey maps in the Botany Department of The Natural History Museum on which they had been marked by hand in the 1940s. No doubt these maps are very useful, but I suspect that even a steady pen cannot trace accurately enough on a scale of 1:63,360. And Burton's use of an *A to Z* street plan was of limited use to me given that it was constructed on a scale in which street widths are artificially inflated and geographical detail is omitted. Living, as I do, on the very edge of a vice-county, I needed to consult a variety of large-scale maps before I could be satisfied where I am.

In London we are lucky that a number of old maps have recently been reprinted (e.g., those published by Alan Godfrey of Gateshead), but if there is any doubt, a visit to the local library, planning office or local history society to start with could avoid the needless worry that I suffered while fretting about which county I should hold allegiance to.

Acknowledgements

Without the kind help of local historian Ron Woollacott and assistance from the staff at Southwark's Local Studies Library, I would still be living in limbo.

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Book review

Dandelions of Great Britain and Ireland. BSBI Handbook No.9. A. A. Dudman and A. J. Richards. Botanical Society of the British Isles, London. 1997. 344 pp. £17.50. ISBN 0 901158 25 9.

The ninth in the BSBI's series of octavo handbooks of problem groups in the British and Irish flora tackles the genus *Taraxacum*, one of the most difficult, with over two hundred species recognized so far, many of them common, though few can be identified without special experience. The nature and origin of the difficulties are fully explained in the introductory material, which gives due warning of the problems of constructing and using the customary system of keys to species, so that this publication should not result in any increase in over-confident misidentifications. Many of the species are illustrated by neat drawings of the all-important involucre bracts, and there is also an easily missed page of drawings illustrating special terms explained in words in the glossary. These are all the usual excellent work of Olga Stewart. It would be nice to have had a description of the method used to prepare the leaf silhouettes which are another essential feature of the data on each of the species.

RODNEY BURTON

Blackheath in the 1950s and 1960s

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Contents

Summary	83
Introduction: the setting and its history	83
Published natural history records	86
Habitat changes in 1953 and 1954	86
Flora	88
Birds	89
Other vertebrates	99
Blackheath in 1996	100
Conclusion	101
Acknowledgements	102
References	102

Summary

The location and topography of the south-east London suburb of Blackheath are described and a review given of its history from Roman times to the present day. An account is given of the ecological changes taking place in 1953 and 1954 when the Heath and its surroundings were recovering from the effects of World War II. The paper is mainly concerned, however, with the natural history observations of the writer while living in the area between 1953 and 1961, with supplementary ornithological notes made by P. J. Grant in 1964, 1965 and 1966, published in the *London Bird Report* No. 31. The paper concludes with an account of recent visits to the Heath, and a note on its present management by the Nature Conservation Section of the London Borough of Lewisham, with the assistance of volunteer members of the local community.

Introduction: the setting and its history

The south-east London suburb of Blackheath and the open space of that name lie to the south of Greenwich Park. The open space is of a very irregular shape (Figure 1). It is carved to pieces by roads that run in all directions, and extends from Vanbrugh Park in the north-east, at TQ 399772, to the top of Lewisham Hill in the south-west, at TQ 385763. It has, of course, the distinction of sitting astride the Greenwich Meridian.

Various estimates have been made of the area of the open space and I am unable to come up with a precise figure. Both Hudson (1898) and Muirhead (1935) gave it as 267 acres (i.e., 108.052 hectares), Hoskins and Dudley Stamp (1963) put it as 270.5 acres (109.468 hectares) and Neil Rhind (*in litt.*) was informed by the Greater London Council that the Heath occupied about 275 acres (111 hectares). In his book (Rhind 1987) he gave the area as '275 acres or so'. Figures supplied by the London Boroughs of Greenwich and Lewisham, the administrators of the Heath, suggest that the actual area of grassy open space may be as little as 74.35 hectares (183.72 acres) for allowance has to be made for the surface area of roads, pavements, etc. In the eighteenth century, when Blackheath really was a heath, it was much more extensive, and stretched from Lewisham to Woolwich (Pevsner 1952).

Blackheath is a plateau with an elevation of around 40 metres (over 131 feet) and is capped by the Blackheath Pebble Beds, beneath which lie the sandy Woolwich and Reading Beds, the Thanet Sand and the Chalk. Richardson (1834) mentions 'a remarkable Cavern . . . consisting of four irregular compartments . . . cut out of a stratum of chalk and flint' that was discovered in 1780. It was open to the public in the 1850s. Masked balls were held there in 1850 and 1853, but the place was closed in the latter year. Photographs were taken there in 1946, after which the entrance was sealed (Rhind 1987).

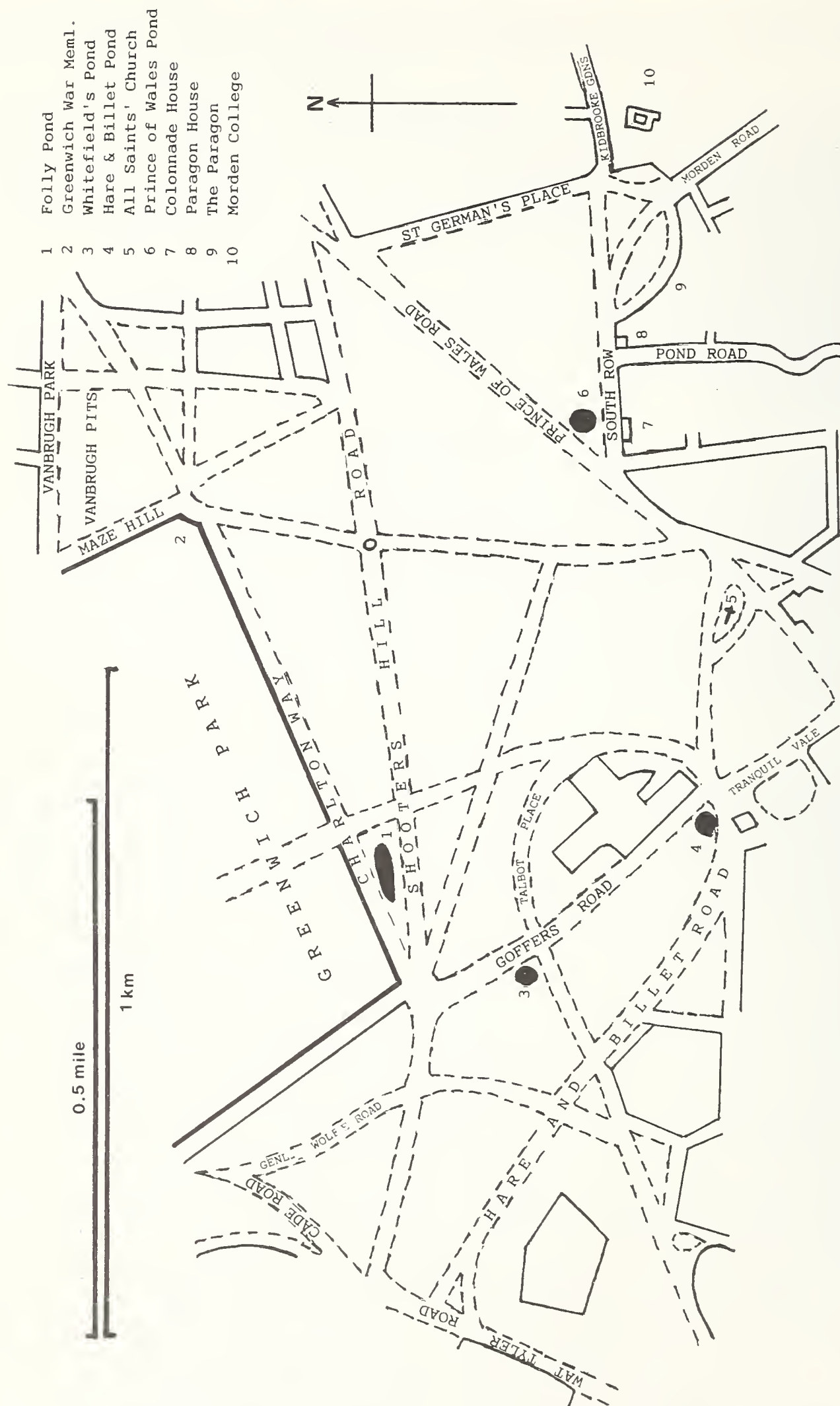


FIGURE 1. Blackheath: the open space and part of the Village.

The plateau slopes steeply towards Greenwich in the north and towards Lewisham in the south-west, but more gently towards the east. Blackheath Village lies in a hollow to the south, the main road having the delightful name of Tranquil Vale. Needless to say it is the busiest road in the Village and is the site of the railway station.

The ponds on the Heath could have originally been flooded gravel pits. There are now four of them. Their history and that of two others, filled in during the nineteenth century, is related by Rhind (1987). Folly Pond, situated at TQ 392768, near the southern entrance to Greenwich Park, was created in the 1890s and was, for a while, used for boating. Whitefield's Pond, named after the eighteenth-century Methodist preacher, George Whitefield, lies at the intersection of Goffers Road and Mounts Pond Road, at TQ 391765. The Hare and Billet Pond, which takes its name from the nearby public house, is at the south-east end of Hare and Billet Road, at TQ 392763. It would, at one time, have been a watering-place for horses and other animals being driven across the Heath. The Prince of Wales Pond, at the junction of Prince of Wales Road and South Row (TQ 398765) would have served the same purpose. This pond, outside the Princess of Wales public house, has long been the haunt of model boat enthusiasts.

It is difficult now to appreciate that Blackheath was once the scene of pomp and pageantry, rebellion and bloodshed, and that it has seen the passage of armies, kings, queens, emperors, civic and ecclesiastical dignitaries and hostile revolutionaries. The events have been chronicled by Richardson (1834), Rhind (1987) and others. Here ran the Roman road from Londinium to Rutupiae, forming the south-eastern stretch of Watling Street. In 1011 the Danes camped on the Heath while their ships rode anchor in the Thames off Greenwich, and 1381 saw Wat Tyler's rebels assembled here before their march on London. In 1400 Henry IV met the Emperor of Constantinople here and, fifteen years later, Henry's son, the 'warlike Harry', was welcomed here by the citizens of London on his victorious return from Agincourt. Henry VI was to see Blackheath one year after his coronation at Westminster, when he returned from a second coronation in Paris. He came again a year after Jack Cade's rebellion of 1450 to meet and pardon the surviving offenders. Cade, their leader had been killed in Sussex, but a quarter of his body was brought to the Heath to be publicly displayed. Like the equally unfortunate Wat Tyler, however, he has, in our own time, been honoured by having a road named after him.

There was another uprising in 1497 and Blackheath was the scene of a battle in which thousands of Cornishmen were defeated by the forces of Henry VII. Many died — the figure of two thousand is sometimes quoted — and they may be buried on the Heath. Henry's son met Anne of Cleves here with a great show of pageantry, Elizabeth I reviewed the City Militia here, and, in 1645, a mock battle took place between two regiments of foot to simulate an encounter between Roundheads and Cavaliers, thereby anticipating by over three centuries the re-enacted engagements now performed elsewhere by the Sealed Knot. Later the Heath was to achieve notoriety as the haunt of highwaymen, some of whom were executed and hung in chains.

Fortunately, history does have its gentler side. The Blackheath Golf Club, which claims to be the oldest in the world, was founded here in 1608. The Club's course is now in Eltham, but we have a reminder of its former location in the thoroughfare named Goffers Road.

Battles are still fought on the Heath, but they are ritualized — there are several football pitches — and the Heath is still an arena for vast assemblies. It witnesses the start of the London Marathon.

The end of the seventeenth century saw the start of the development around the Heath which was to give the neighbourhood its pleasantly distinctive character. Sir John Morden's almshouse for 'decayed Turkey merchants', Morden College, was built in 1695. Its design is attributed to Sir Christopher

Wren, and it stands in grounds that were landscaped in the eighteenth century. Sir Gregory Page, a South Sea millionaire, had a Palladian mansion called Wricklemarsh built to the south of the Heath in 1721. It was demolished in 1787, making way for the development of an estate called Blackheath Park, but according to Pevsner (1952) parts of it, the Tuscan columns, were used to form the colonnade in the construction of The Paragon, a fine late eighteenth-century crescent of which more will be written later. Many other eighteenth-century and early nineteenth-century buildings were to rise around the Heath, but only two of them, Paragon House and Colonnade House, need to be mentioned in this account. Both The Paragon and Colonnade House were designed by Michael Searles.

Published natural history records

The natural history of the Heath has been less well documented than the human activity. Malcolm Smith (1951) states that Bell (1849) recorded natterjack toad *Bufo calamita* there. He fails to give the reference in his bibliography, but Frazer (1983) lists a publication of that date, the second edition of *A history of British reptiles*, which suggests that Bell ignored the fact that the animal is an amphibian. Fitter (1949) considered all the London Area records of this species to be vague and unsatisfactory, and he did not repeat Bell's claim in his New Naturalist volume (Fitter 1945). The only reference to Blackheath, in fact, is a mention of the Pebble Beds.

Blackheath is not mentioned in Fitter's (1949) check-list of the mammals, reptiles and amphibians of the Society's area, but J. F. Burton was able to make an important contribution to his later paper (Fitter 1950) by submitting records of hedgehog *Erinaceus europaeus*, field vole *Microtus agrestis*, wood mouse *Apodemus sylvaticus*, smooth newt *Triturus vulgaris* and common frog *Rana temporaria*.

Birds have received more attention. Hudson (1898) dismissed the Heath as 'nothing but a large green space used as a recreation ground, where birds settle to feed but do not live'. Given the chance, however, a few opportunist species have actually bred, like the yellow wagtails *Motacilla flava flavissima* that nested in dumps of bomb-site rubble in the 1940s and again in 1951 (Burton 1972). Piles of rubble also provided sites for two pairs of wheatears *Oenanthe oenanthe* in 1946 (Montier 1977). Like the wagtails, they were recorded by J. F. Burton. Grant (1967) makes several references to birds on or over the Heath, although he mainly concentrates on the avifauna of Greenwich Park. There are also reports in the section devoted to London County Council open spaces included in the HMSO publication *Bird life in the Royal Parks* (Gault 1955, Teagle 1957, 1959).

Habitat changes in 1953 and 1954

I moved to Blackheath in March 1953, having finally escaped from a dreary part of north-west London where I had lived since the age of seven. It was a new world, with an immense expanse of grass and sky, and there were trees around the Heath that had been allowed to grow to their full height, in marked contrast to the brutally pollarded trees in the road I had left behind. My flat at the top of No. 2 The Paragon was reached after a climb of sixty-four stairs. I therefore had an excellent view of my new territory. My bedroom window overlooked the Heath, and my living room opened on to a small balcony that looked across the partially developed Paragon garden towards the area still called Blackheath Park.* A caravan site was visible from the balcony and, further out, beyond the railway cutting, there were piggeries.

*There is no park here, as one might be led to expect, and the existence of a tree-lined road also called Blackheath Park only adds to the confusion.

Just as my own habitat had changed dramatically, so were there great changes taking place in my immediate surroundings. Many had occurred prior to my arrival. During the Second World War barrage balloons had floated over the Heath. There were searchlights, gun emplacements and rocket batteries. Nissen huts were erected to accommodate the military personnel, and once these were vacated, in September 1946, they were taken over by squatters. Bomb-site rubble was dumped on the Heath, filling in all but one of the remaining gravel pits, and prefabricated houses were erected to accommodate Londoners made homeless by bombing.

The Heath was in a transitional state when I appeared on the scene. The Nissen huts had gone, but the prefabs were still there and were to remain for some time. There were large areas where the vegetation had been left more or less unchecked and these provided suitable conditions for the skylark *Alauda arvensis*, a species that had also taken advantage of unmown vegetation on Hampstead Heath and Wormwood Scrubs (Montier 1977). The year 1953 was to see the end of such favourable sites on Blackheath. Fences were erected and notices appeared that announced that the ground was being 'reinstated'. Some of the enclosures probably acted as sanctuaries, however, for larks were heard singing until late June, with as many as three doing so on 1 April. It seems probable that a few pairs managed to breed in spite of the ploughing and sowing that went on. During June most of the rough areas were ploughed up, but two birds were still frequenting the enclosed, ploughed expanse east of Talbot Place on 22 August. A bird was also seen in August which J. F. Burton considered to be a juvenile.

Wheatears could often be picked out on the ploughed areas during passage periods, especially in August, and a brambling *Fringilla montifringilla* was noticed on 31 March. Carrion crows *Corvus corone*, jackdaws *C. monedula* and gulls also frequented the disturbed ground. The gulls were mostly common gulls *Larus canus*, but there were also lesser black-backed gulls *L. fuscus*.

The fences and notices were still standing at the end of the year, but the enclosed areas were now green.

More devastating were the changes which took place to the south of The Paragon. I recorded these in some detail at the time and may perhaps be allowed to quote verbatim from that account. In doing so I have omitted the scientific names of plants and animals since these would disrupt the flow of words. They did not appear in the original. A few notes have been added here and there in parentheses:

'All too few visits were paid to the wilderness behind The Paragon before the axes and the bulldozers got to work. Half of The Paragon garden was in an unformed state when I moved in on 26th March. It was, in fact, a bare expanse of mud, peppered with Blackheath's characteristic pebble-pellets, and it was not until well into the spring that it began to turn a timid and insipid green. The garden door of No. 2 was locked . . . for the (outside) steps had yet to be provided. The steps appeared in due course, but the door remained locked for a good time afterwards.

'It was this difficulty of access which made my visits to the "wilderness" very few indeed. My first penetration in fact was made on 11th May, and force of circumstances made it a very brief one. I found the Hamiltons (Sir George and Lady Hamilton) of Paragon House fussing around a mother mallard and her brood of three in their front garden (in South Row) — just at the time I ought to have been running for a train. We caught the ducklings with the idea of putting them on the Princess (*sic*) of Wales Pond. But the duck flew to the lawn of Paragon House — in the opposite direction — and so Sir George and I took the ducklings through the garden and set out for quite a different pond which lay beyond the "wilderness". (The pond was originally a feature of Sir Gregory Page's estate (Rhind 1987)).

'We passed from the garden of Paragon House into a tangle of vegetation — a mixture of cultivated and wild plants covering the remains of out-buildings, . . . tall willows, walls of bramble (and) a sort of cartouche-shaped concrete pond choked with aquatic weeds. Then, beyond the willows, the pond — a sheet of duckweed littered with fallen branches,

and a waving forest of reed-mace.' It was not the sort of pond one expected to find so near the centre of London. It did not survive for long.

'On 29th June I found that the waters upon which we had launched three cheeping ducklings little more than a month before had disappeared. There was only mud — very wet and still covered with the green confetti of duckweed . . . The habitat was soon to be swept away. Lorries made Pond Road their highway, walls fell and fences went up. As I crossed the top of the road each morning I looked down it to see if the green of the reed-mace still showed. It was there for quite a while, then bricks and rubble buried the dried mud of the pond, and the remaining willows were left standing in a pinkish desert where once moorhens had paddled (so I'm told) and newts had lurked. Yes, the pond went, and all that remained was its name — preserved in Pond Road. During the autumn the brambles followed suit, and in the wake of the bulldozers came the cement-mixers and the brick-layers . . .

'Although I rarely went down into the "wilderness" (behind The Paragon) its voices came to me from across the garden throughout the spring and summer. Some of the voices were undoubtedly those of migrants. Chiffchaffs did not sing between 15th May and 2nd August and no willow warbler was heard between 21st April and 26th July. But blackcaps often sang and whitethroats were persistent. The first one (whitethroat) I saw and heard on that hurried dash to the pond, ducklings in hand. That particular bird may have been a (passing) migrant, but others most certainly stayed, and almost every morning in June and often in July I would hear the scratchy song. One was seen in song-flight in The Paragon garden itself on 28th June. Then on 2nd August a female was seen feeding three well-fledged young.

'Throughout most of 1953 the ground behind the two blocks that formed Nos. 5–8 in the crescent lay untended; the houses themselves were untenanted and uninhabitable, having been damaged by bombing during the war. Before the finch population could exploit the seeding weeds, however, work began on the houses and by the end of the year this part of the garden had been changed into something resembling that behind Nos. 2–4 at the time of my arrival.

'Building work continued throughout 1954, not only behind The Paragon, where flats had been erected, but on the ruined part of The Paragon itself. Whereas in 1953 it was possible, by leaving the living-room window open, to hear the voices of the warblers as they arrived, in 1954 one could rarely hear anything for the noise of cement-mixers, lorries and all the mechanical dinosaurs that are put into service by the building industry. Much of the area behind The Paragon remained un-built on even at the end of the year, but it had little attraction for birds. But thrushes, blackbirds, starlings and sparrows continued to frequent the (Paragon) lawn, and jays, woodpigeons and goldfinches still haunted the trees. The green and great spotted woodpeckers seemed less frequent and no breeding spotted flycatchers were noticed . . .

'The heath itself remained much the same. The areas which had been "closed for reinstatement" remained closed all through the year, developing their grassy covering and providing secluded resting places for common, black-headed and lesser black-backed gulls, and feeding-places for crows, jackdaws and starlings. The larks sang bravely, but any nesting attempts they made must have been frustrated by the mowing and rolling which took place periodically.'

Flora

In the 1950s I was mainly interested in vertebrate animals and, regretfully, I paid little attention to plants. I am therefore unable to make any detailed comment on the vegetational changes that took place when the Heath was transformed from a skylark habitat to the sort of bleak green desert that typifies urban grassland. The changes that took place in the garden of The Paragon and in Pond Road were only slightly better recorded. It is fortunate that I did make a note of some of the plant species seen on that fleeting visit to the pond in Pond Road. The duckweed *Lemna* sp. has already been mentioned, as has the (great) reed-mace *Typha latifolia*, which Stace (1991) calls bulrush, having apparently yielded to the pressure of public misuse. (In the botanical literature of the 1950s the bulrush was *Scirpus lacustris*, now classified by Stace as *Schoenoplectus lacustris*, with the vernacular name of common club-rush). I also saw water mint *Mentha aquatica*, gypsywort *Lycopus europaeus* and celery-leaved buttercup *Ranunculus sceleratus*.

April 1954 saw the launch of the BSBI scheme to collect data for its *Atlas of the British flora* and I was encouraged to survey the one-kilometre grid square which included most of the Heath, a small part of Greenwich Park, most of The Paragon garden and front lawn, and three areas of waste ground — that lying behind Nos. 5–8, the Pond Road building site and another site near the post office in Blackheath Village. It was by no means a comprehensive survey and the absence of grass species from the following list is indicative of my botanical ignorance at the time. Plants found in Greenwich Park have been omitted. Those marked H were found on the Heath, those marked S were noted in streets and gardens, and those marked W were waste ground species. Stace's (1991) nomenclature has been followed, but the species are presented in alphabetical order.

Atriplex prostrata spear-leaved orache SW.

Chamerion angustifolium rosebay willowherb SW.

Chelidonium majus greater celandine S.

Chenopodium album fat-hen HSW.

Circaea lutetiana enchanter's-nightshade W.

Conium maculatum hemlock W.

Epilobium hirsutum great willowherb W.

Fallopia convolvulus black-bindweed W.

Lotus corniculatus common bird's-foot-trefoil H.

Malva neglecta dwarf mallow S.

M. sylvestris common mallow SW.

Oenothera sp. evening-primrose W. This was recorded at the time as *O. biennis* but in view of the comments on this species made by Burton (1983) it was possibly misidentified.

Pastinaca sativa wild parsnip W.

Persicaria maculosa redshank HSW.

Polygonum aviculare knotgrass HSW.

Raphanus raphanistrum wild radish W.

Silene latifolia white campion W.

S. vulgaris bladder campion W.

Sinapsis arvensis charlock W.

Sisymbrium officinale hedge mustard SW.

S. orientale eastern rocket HSW.

Spergula arvensis corn spurrey H.

Apart from these species the plants of the area were scarcely recorded at all. Gorse *Ulex europaeus* grew, as it still does, in Vanbrugh Pits, the old gravel pit in the north-east corner of the Heath, near Vanbrugh Park, and it received a mention in my notes because a pair of linnets *Carduelis cannabina* chose to nest in it in 1957. I remember seeing wood sage *Teucrium scorodonia* in this 'wilder' corner of the Heath, as well as sheep's sorrel *Rumex acetosella* and buck's-horn plantain *Plantago coronopus*. I also recall finding harebell *Campanula rotundifolia* on the edge of the shallow ditch that formed the outer boundary of The Paragon's front lawn. It was much later, however, that I made my only noteworthy botanical discovery at Blackheath. On that same lawn in 1961 I found about thirty patches of subterranean clover *Trifolium subterraneum* (Lousley 1962), a plant first recorded from Blackheath over 180 years ago.

Birds

Birds received a good deal of attention between 1953 and 1958, after which only a few notes were made although I continued to live at Blackheath until 1961. From 1954 onwards my observations were supplemented by those of Rosemary Gault (REG) who became my wife (RET) for a short period. An enthusiastic and reliable naturalist, her reports on the birds of Blackheath appear, first under her maiden name and then under her first married name in

the 'Note on birds in LCC parks and open spaces' which, in spite of that heading, was a feature of the HMSO publication *Bird life in the Royal Parks*. Her unpublished records make an important contribution to this paper.

I have also, for the sake of completeness, included those made by the late Peter J. Grant, who was involved in a study of the birds of Greenwich Park between September 1964 and November 1966 (Grant 1967). His main reason for including the Heath in his daily census was 'to count the gulls which gathered in the early mornings', although in his paper he only quotes the actual numbers of the herring gull *Larus argentatus* and the great black-backed gull *L. marinus*. He does, however, mention several other birds which are of interest. Whenever his name appears in the following paragraphs the reader may assume that the observation was published in the paper mentioned above. The nomenclature in the systematic list which follows is that of Voous (1977):

Grey heron *Ardea cinerea*: One flew over The Paragon on 2 August 1956.

Mute swan *Cygnus olor*: Swans were very occasionally seen flying over the Heath, and single birds or a pair would sometimes frequent one or other of the ponds, but only for very short periods, not usually for more than a day. Birds were only seen on Whitefield's Pond once, on 26 March 1953, the day I moved to Blackheath. The Prince of Wales Pond was the one most frequently visited; one or two birds were seen there in March 1954, June and December 1957, January, February, March and October 1958, and January 1959. Occurrences were more frequent when Grant was watching the Heath. He commented on the 'unprecedented regularity of this species on the small ponds . . . outside the breeding season' in 1966. Three of the visitors had been ringed, one at Wanstead, one at Rye Meads and one at Chelsea.

Mallard *Anas platyrhynchos*: In spite of the large mallard population in Greenwich Park only a few birds were seen on the Heath ponds in 1953. A pair was noticed on the Hare and Billet Pond on 31 March and two drakes were often on the Prince of Wales Pond in April. Breeding did, however, take place and mention has already been made of the ducklings found in the garden of Paragon House. In 1954 mallards made use of Folly Pond from February to April, but there was no more activity until 2 July, when a pair was present. Five young eventually appeared on the pond, but the breeding site is unknown. The LCC keepers moved the brood to a less-exposed pond, but a female and four ducklings, four to five weeks old, were present on 24 July. During August the number of young dropped to three, but these were successfully reared. A pair noted on the Prince of Wales Pond in the spring did not achieve anything. There was a lot of disturbance from model craft on this pond, especially at weekends. Breeding was not recorded anywhere in 1955, but in 1956 REG saw two broods of different ages on the Hare and Billet Pond on 31 May. One small duckling was seen on Folly Pond in late April and early May 1957, but it apparently did not survive. No young were seen anywhere in 1958.

Sparrowhawk *Accipiter nisus*: In 1954 I saw a female over the snow-covered Heath on 31 January. REG saw one gliding and circling on 3 May and, independently, we both saw one soaring on 11 May.

Kestrel *Falco tinnunculus*: Kestrels were recorded on numerous occasions between 1 April 1953 and 2 October 1958. A pair showed some interest in the spire of All Saints' church on the Heath, but not during the breeding season as far as I know. A female was flushed from the balcony of our flat by RET on 15 April 1956.

Crane sp. I saw a crane flying over the south edge of the Heath on 8 April 1960. My attention was first attracted by its call, a rolling 'karruch-karruch-karruch'. The bird flew mainly at about 60 m, but once coming down to about 45 m. Its neck was held straight out, and its bill was not noticeably long. There was nothing to suggest a stork rather than a crane, and it was definitely not one of the Anatidae. The wings seemed longer than a grey heron's — not so broad or spoon-shaped — and the primaries were separated. I had no binoculars at the time, but the general impression of colour was a pale grey, with the upper surface of the wing looking much darker on the down beat. There appeared to be a dark patch at the base of the neck or in the middle of the breast, but this could have been a trick of the light. The bird circled and soared as if uncertain of direction or as if tempted to land on the Heath. Then it was pursued by a large flock of common gulls which had risen from the Heath. The leading gulls made straight for the crane, which was a good three times the size of one of the gulls. While being thus disturbed the crane moved south towards Blackheath Park, then, after the gulls had

gone, it flew north-east and out of sight. It was presumably a bird which had escaped from captivity.

Lapwing *Vanellus vanellus*: Lapwings were seen flying over the Heath in June and November 1954, March and July 1955, August 1957, January and October 1958, and February and June 1960. The usual direction of flight was west or north-west, as was observed by Grant in Greenwich Park over the years 1964 to 1966. I have no details of the birds seen by RET on 19 October 1958, when there was a remarkable passage of birds of many species (Teagle 1959), but my own records are of small numbers, the most recorded on any one day being fourteen on 25 February and again on 26 June 1960. On 26 January 1957 a lapwing alighted on the Heath for about a minute near the Blackheath Gate of Greenwich Park.

Woodcock *Scolopax rusticola*: A bird which frequented Greenwich Park in January and February 1954 (Brown and Phillips 1955) was also seen on the Heath (Gault 1955).

Curlew *Numenius arquata*: I heard one calling over Blackheath Park on 20 August 1955. Grant saw one feeding with the gulls on the Heath on 12 February 1966.

Black-headed gull *Larus ridibundus*: I appear to have paid little attention to this species, except during 1958, probably because I became mainly interested in the large number of common gulls that were such a feature of the Heath. My records of black-headed gulls are chiefly of birds seen in late March or during July, i.e., at a time when they were on their way to or from their breeding grounds. I feel reasonably certain, however, that black-headed gulls were less numerous than common gulls and this is certainly suggested by counts made of both species during 1958 (Table 1). There were many days when common gulls were present, but black-headed gulls were not. Grant does not mention the numbers of these two species in his paper.

Common gull *L. canus*: This is a bird I shall always associate with Blackheath. The species was recorded in every month of the year, with a pronounced movement during April. I could count the gulls on the eastern part of the Heath from my bedroom window and I was able to note the fluctuations in numbers that took place over a matter of minutes. On 3 April 1953, for example, there were 130 at 07.35 GMT and c.450 at 08.00. These had all gone by 08.15, but another 59 were present at 09.20. They departed before 09.50. On 5 April 1953 there were 164 + at 07.05, with others arriving, 148 at 07.30, eight at 08.05 and none at 08.30. On 6 April 450 + seen at 07.15 had all gone before 07.35. On 8 April 212 were present at 07.05, 58 at 07.18, five at 07.20, thirteen at 07.26 and one at 07.34. It or another singleton was there at 07.50. I had relatively few May records over the years. Eleven were seen on the Heath at 06.05 GMT on 22 May 1955, and fifteen, mostly immature birds, were present on 6 May 1956. In May 1957, however, I saw common gulls on five dates, with a maximum of 53 at 05.50 GMT on the 8th. Only twice did I see them in June, with a regretfully unrecorded number on 20 June 1953 and thirteen immature birds at 06.25 on 4 June 1960. July saw the gulls returning after the breeding season, with just under 100 on 14 July 1956, seen with one black-headed gull and four lesser black-backed gulls. Numbers were often quite high during August and early September, e.g., 110 on 9 August 1957, 117 on 17 August 1958 and 89 on 1 September 1961. The few counts I have for October and November suggest that numbers did not exceed 150, but during the winter months over 400 birds could be present, and they were inclined to spend more time on the Heath during the day, especially on those parts where the ground surface had been disturbed by football boots. A few birds also visited the ponds on the Heath.

TABLE 1. Counts of black-headed and common gulls on Blackheath during 1958.

Date	B-h gull	Cmn gull	Date	B-h gull	Cmn gull	Date	B-h gull	Cmn gull
14 Feb.	80 +	440 +	10 Aug.	2	31	24 Oct.	7	125
13 July	3	10	19 Aug.	3	69	30 Nov.	42	163
2 Aug.	1	28	11 Oct.	7	24	21 Dec.	20	270

Lesser black-backed gull *L. fuscus*: This species was recorded in every month of the year, but numbers seen in 1953, 1954 and 1955 never exceeded ten. On 12 September 1956 a scattered flock of 40–50 birds was noted and in the years that followed such a gathering became a commonplace. A marked passage took place during August,

September and October. The presence of over 200 on 24 September 1957 could to some extent be attributed to coastal gales, but large flocks were also seen on more temperate days. On 16 October, 75–80 were present, and in 1958, 82 on 28 August, 94 on 31 August, over 90 on 30 September, 182 on 12 October (on which day K. H. Hyatt counted 131), 87 on 19 October and 72 on 26 October. Birds with very dark wings and mantles, possibly belonging to a Scandinavian race, were seen in August 1957, August and October 1958 and September 1961.

Herring gull *L. argentatus*: Herring gulls were irregular visitors. Two adults with two immature birds considered to be of this species were seen on a frosty day in 1956, 19 January. One was noted on 6 January and two on 5 February in 1957, ten on 14 February 1958, single birds on 24 October and 21 December of that year, and one on 3 January 1959. Grant recorded herring gulls only in October during 1964, singles on the 4th and 13th and seven on the 14th. In 1965 he saw one on the Heath and two in flight on 21 February, sixteen on 23 December and one the next day. Single birds visited the Heath on 25 October and 8 November 1966.

Iceland gull *L. glaucoides*: RET and I noticed a very pale gull with the common and black-headed gulls near the Greenwich War Memorial on 6 February 1957. On closer examination it proved to be an immature Iceland gull. Details of plumage, bill and tarsi were submitted to the Records Committee of the Ornithological Section and the record was accepted.

Great black-backed gull *L. marinus*: In 1957 an oiled adult was seen on 6 February and an immature bird appeared with the many lesser black-backed gulls on 24 September. In October 1964 Grant recorded six on the 12th, three on the 13th and five on the 14th, one on 17 October 1965 and one on 4 January 1966.

Stock dove *Columba oenas*: Stock doves were often seen and heard around The Paragon and Morden College between 1953 and 1957. They perched on the chimneys of Nos. 3, 5 and 7 The Paragon, and in 1956 single birds were seen on the parapet outside my flat on 4 May and 6 July. Grant did not once see stock doves feeding in Greenwich Park, and only once did I see birds on the Heath — two on 28 March 1954 on a grassy area that had been closed for reinstatement.

Woodpigeon *C. palumbus*: Birds came to feed on my balcony, usually one or two, but as many as six together on 6 January 1955, a day of frost and powdery snow. During my period of residence I trapped and ringed three birds, at least two of which returned to take food and drink. Large flocks fed on the Heath, especially on the fenced areas during July and August 1954, with as many as 171 on 28 July. Seventy-eight on 12 June and over 80 on 29 June were the maxima seen in 1955 and around 200 were recorded on 18 May 1957. Nineteen birds flying purposefully west at about 76 metres (250 feet) at 07.25 GMT on 25 October 1953 could have been migrants.

Cuckoo *Cuculus canorus*: Cuckoos were heard in the spring of 1953, 1954, 1956 and 1957, usually from south of The Paragon, with the earliest on 22 April 1953 and the latest on 20 June 1954.

Little owl *Athene noctua*: One was seen by REG on the north side of the Heath on 16 March 1954 before it flew into Greenwich Park.

Tawny owl *Strix aluco*: Tawny owls were resident in the area south of the Heath, but I obtained no proof of breeding. I often heard them duetting and occasionally saw one near The Paragon. Their calls often came from the grounds of Morden College.

Nightjar *Caprimulgus europaeus*: RET flushed one on the Heath at dusk on 5 May 1958 (*Lond. Bird Rep.* 23: 33, and Teagle 1959).

Swift *Apus apus*: Swifts were present throughout the months of May, June and July, and there were several August records. The earliest sighting was on 3 May in 1953 and the latest on 12 September in 1955. Normally most of the birds had departed by the middle of August, but on 21 August 1956 50–60 were seen moving east over Blackheath Park and there were over 20 over Kidbrooke Grove. Breeding almost certainly took place in the houses of Vanbrugh Park, where birds were seen repeatedly shooting up to the eaves on 15 July 1956 and on 25 June and 6 July 1958. On 27 July 1957 about 40 were watched following a motor mower cutting the grass on the Heath near St German's Place.

Green woodpecker *Picus viridis*: This species was resident locally between 1953 and 1958, but I had no proof of breeding. I often heard them calling near The Paragon, especially during July and August 1953, but I did so less often in 1954, probably because of the disturbance caused by building operations south of the crescent. They

remained in the area, however, and I heard their calls on nine occasions in May and August 1956, once while waiting for a train on Blackheath station. RET saw one fly past The Paragon on 13 July 1957.

Great spotted woodpecker *Dendrocopus major*: One would have expected that this woodpecker would have been recorded more often than the last species, but in fact I only noted it on twelve dates between June 1953 and May 1959, with no records at all in 1958. A bird was heard drumming in Blackheath Park on 21 March 1954.

Lesser spotted woodpecker *D. minor*: On 16 May 1953 I watched a pair mating in a tree on the front lawn of The Paragon, and one was heard calling to the south of the crescent on 1 September of that year. In 1957 I heard one calling from the latter area on 7 January and another in Morden Road on 2 June.

Woodlark *Lullula arborea*: Grant saw one flying low over the Heath on 19 October 1964.

Skylark *Alauda arvensis*: Mention has already been made of the birds that sang over the Heath in 1953. In the following year REG heard one singing on 21 and 27 February and she and I heard birds singing throughout March, April, May and June. There appeared to be at least three pairs on the Heath during April, but it is unlikely that any managed to breed for the enclosed areas were now being mown at intervals. In spite of such activity, birds were heard singing from March to June in 1955, by the middle of August of which year very few fences were left standing and no large areas were enclosed. Song was heard on eleven dates in 1956 between 16 March and 21 July, and for the last time on 11 March 1957. Only in 1966 did Grant see larks on, as opposed to over, the Heath. Up to four were regularly seen feeding between 14 January and 17 March, and these could have been birds that came in during a cold spell. Like Grant, I saw larks flying over on autumn passage. An exceptionally strong movement was witnessed on 19 October 1958, when chaffinches *Fringilla coelebs*, starlings *Sturnus vulgaris*, meadow pipits *Anthus pratensis*, thrushes *Turdus* spp. and lapwings were also passing over. Altogether over a thousand birds were involved, mainly heading in a westerly/north-westerly direction (Teagle 1959). I counted 128 skylarks overhead in the thirteen minutes it took me to walk to Greenwich Park from The Paragon, and another twelve larks on my way back. Unfortunately I do not have a record of RET's observations which were made in the intervening period, but I saw 80 during my visit to Greenwich Park between 09.32 and 11.24 GMT.

Sand martin *Riparia riparia*: My only record was of two flying low over the Heath on 26 August 1958.

Swallow *Hirundo rustica*: Swallows were only seen on migration. The existence of the piggeries close at hand in 1953 raised my hopes that some would stay to breed, but no birds were seen between 16 May and the start of the autumn movement. Swallows were seen on spring and autumn passage in 1953, 1954, 1955 and 1956, on spring passage only in 1956 and 1959 and on autumn passage in 1961. None was seen in 1957 or 1960. The earliest date recorded was 21 April, in 1958, and the latest was of nine seen on 3 October in 1958 by RET. Large numbers were noted on only one occasion; REG saw between 100 and 300 on 18 September 1954. House martins *Delichon urbica* were on the move at the same time, but the swallows kept in separate groups, mainly in parties of 20 to 30.

House martin *Delichon urbica*: This was a summer resident as well as a bird of passage. Eight or nine pairs nested in the Village in most years between 1953 and 1958, with the main colony centred on Royal Parade, Montpelier Vale and Brigade Street (Figure 2). In 1953 it is possible that nesting also took place in Wemyss Road and at Talbot Place/Blackheath Vale, but these sites were not discovered until 1954. The martins often seen around The Paragon in the summer of 1953 were probably from Wemyss Road. In October 1954 a previously unsuspected colony was found in Southvale Road. On a chance visit on the 3rd of that month five nests were located, one of them still occupied, and another nest, which could have been used during the year, was found on All Saints' Parish Hall close by. These six nests, together with those in Royal Parade, Montpelier Vale, Talbot Place/Blackheath Vale and Wemyss Road, would have brought the breeding population for 1954 up to eighteen pairs. In subsequent years broken nests were seen at several of the sites, suggesting human interference, and the number of pairs breeding is unlikely to have exceeded nine. Adult birds, often accompanied by juveniles, sometimes gathered on buildings around the Heath, especially at the start of the autumn migration, and on 17 August 1957 two adults and two juveniles perched on the parapet of my flat, one juvenile being fed by the parents. The autumn passage took place mainly in August and September, with the greater activity taking place in the second week of the latter month. Parties of 40 to 50 were often seen, and on 18

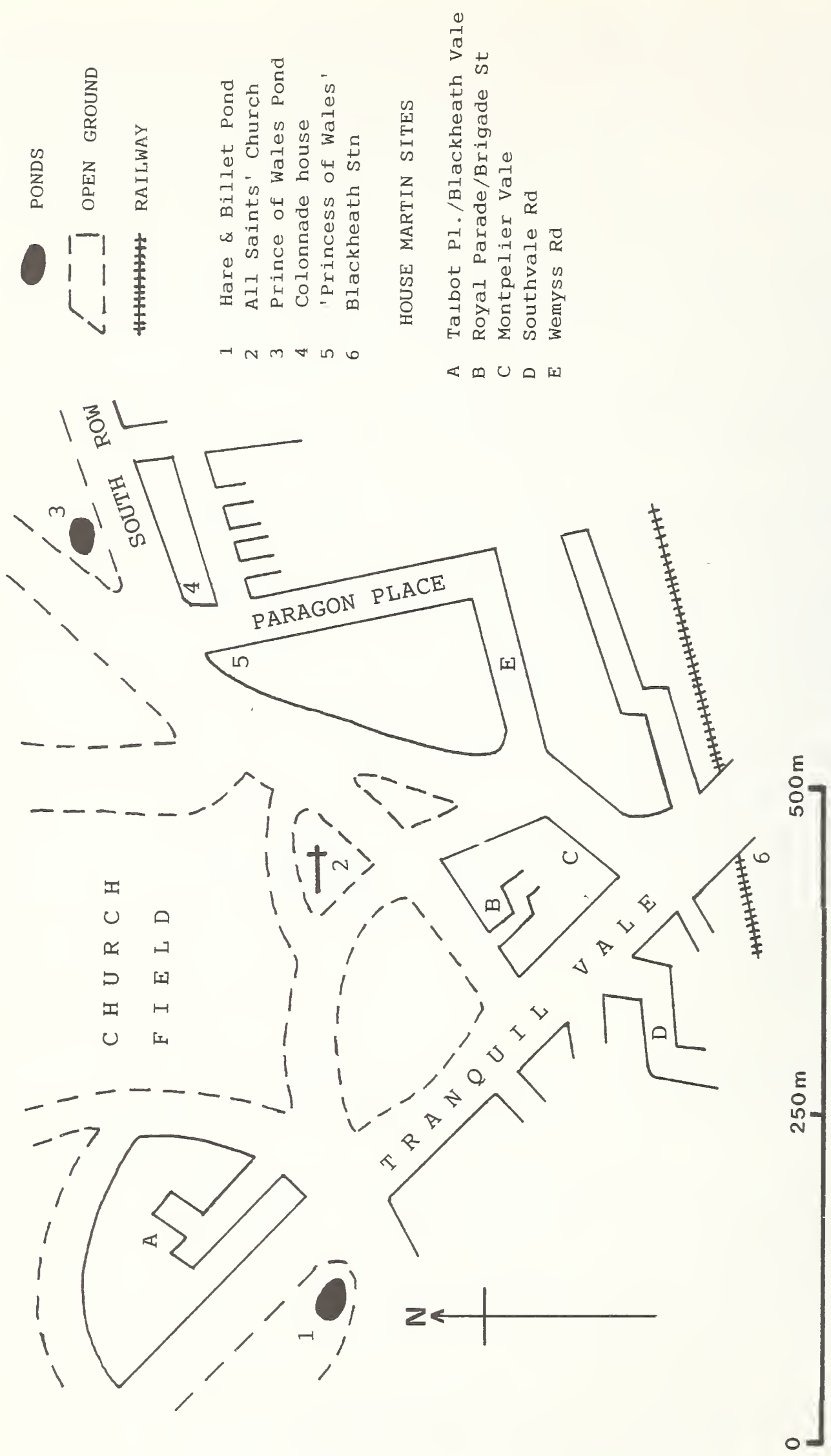


FIGURE 2. Breeding-sites of house martin *Delichon urbica* at Blackheath, 1953-1958.

September REG estimated that at least 500 were flying over the Heath and the village in the early evening. My latest record was of two birds battling against a south-westerly gale on 1 November 1953. On a few occasions I saw birds entering vacated nests at dusk, presumably to roost.

Meadow pipit *Anthus pratensis*: Small numbers, usually singletons, were seen flying over in October 1954, February, October and November 1955, September 1957, and January, October and November 1958. Meadow pipits were amongst the species RET saw moving in a westerly/north-westerly direction on 19 October 1958, but I do not have the details. I saw one bird alight on the Heath on 6 September 1957 and Grant saw two spring migrants on the Heath on 8 April 1965.

Yellow wagtail *Motacilla flava*: REG saw and heard one flying west over the Heath on 22 September 1954. I saw and heard one flying east on 4 April 1957 and a bird on the north-east corner of the Heath on 25 April 1958 that had a white chin and eye-stripe.

Grey wagtail *M. cinerea*: A bird seen by the Prince of Wales Pond on 8 October 1956 was my only record.

Pied wagtail *M. alba yarrellii*: This species was often encountered on or over the Heath, sometimes near one or other of the ponds. It was seen around The Paragon in every month of the year, frequenting the front lawn, the garden, the rooftops and my balcony. A hen seen collecting food in the Wilderness in Greenwich Park on 20 June 1954 flew eastwards out of the Park to an undiscovered nest which could have been on the Heath or in a nearby garden, and on 29 May 1955 a pair was seen feeding young in a hole in a horse-chestnut *Aesculus hippocastanum* on the front lawn of The Paragon. Two young were subsequently seen being fed in the garden. Nesting was not proved in 1956, but one wagtail was seen making a spirited attack on two carrion crows flying over The Paragon on 3 May. On 9 July 1957 a female was seen feeding a fledgling on my balcony and on 25 August 1958 a cock was seen feeding a juvenile bird on the flat roof connecting No. 2 with No. 3. Grant recorded locally bred juveniles on the Heath in August 1965 and June 1966. I did not see any obvious passage movements over the period 1953 to 1958.

Wren *Troglodytes troglodytes*: Wrens were naturally confined to the gardens and grounds surrounding the Heath. Their loud song could be heard from the garden of The Paragon, the grounds of Morden College, the garden of the Junior House of Blackheath High School in Morden Road, the wooded railway embankment near Blackheath Station — almost anywhere in fact where there was sufficient cover.

Dunnock *Prunella modularis*: Hedge sparrows, to use the name by which they were officially known in the 1950s and 1960s, were not recorded assiduously. They were seen or heard in the gardens and grounds on the south side of the Heath, on the bomb-site by Colonnade House, and in the shrubbery by the Heath Keeper's house on the north side of the Heath. This was an under-recorded species. The paucity of notes suggest that it was neglected rather than uncommon.

Robin *Erithacus rubecula*: Robins too were somewhat neglected and I made no notes on this species in 1953 or 1954 although it was undoubtedly present. On 8 September 1955, however, one came to my balcony for the first time, and this or another bird made occasional visits in 1956, accepted mealworms and sang from the parapet. Song was often heard from the elm *Ulmus* suckers that grew in the ditch that separated the front lawn of The Paragon from the Heath, and an adult was seen feeding a fledgling here in July 1957.

Redstart *Phoenicurus phoenicurus*: A female was seen in the above-mentioned elm suckers in the morning of 13 April 1963 and a cock appeared in the garden of The Paragon in the evening on the same day.

Whinchat *Saxicola rubetra*: A bird seen on the lawn of The Paragon on 28 September 1957 was my only record.

Wheatear *Oenanthe oenanthe*: Wheatears were recorded on the Heath on spring and autumn passage in every year from 1953 to 1958. The earliest was one seen on 25 March in 1955, and the latest was one noted by REG on 13 September 1954. During 1955 wheatears were seen on seven dates between 25 March and 12 May, with as many as seven on the latter date. They occurred on five dates between 15 and 25 August. The maximum seen on any one day in 1956 was eight on 26 August, while ten were noted on 13 August 1957. One perched on one of the chimney-pots of No. 3 The Paragon on 17 August 1953, and birds occasionally appeared on the front lawn in 1954 and 1958. Grant recorded single wheatears on the Heath on 23 March 1965 and 16 August 1966.

Blackbird *Turdus merula*: My notes are mainly of birds which came to the balcony to feed, a habit first noted in June 1954 when a hen came and collected food for young. Single cocks also visited, one a first winter bird in February 1957. In that year a hen not only came to feed but also for nest material, obtained from the large tub of wild plants I grew on the balcony. A pair, perhaps 'my' pair, nested in a hollow in the trunk of a horse-chestnut on the lawn in 1957.

Fieldfare *T. pilaris*: Three were seen and heard flying west over The Paragon on 25 October 1953, one flew over heading east on 26 March 1955, and on 20 February 1956, when there was snow on the ground, I saw one fly from a tree on the corner of The Paragon and Morden Road.

Song thrush *T. philomelos*: This species was under recorded once I got over the novelty of living amongst song thrushes. Their song was heard from January onwards and they were usually to be found on the lawn or in the garden. In 1955, 1956 and 1957 they were seen collecting food, and juvenile birds were noted in 1956. I have only one record of a bird seen on the Heath itself, one just outside Greenwich Park on 2 August 1958.

Redwing *T. musicus*: In 1954 redwings were heard passing over the Heath at night on 28 October, and on six nights in November. REG, who was living in the Superintendent's Lodge in Greenwich Park at the very edge of the Heath, heard them passing over at 02.00 hrs GMT on 29 October in the same year. Birds were also heard at night during the week ending 12 November 1955 and on 17 December of that year there were five in The Paragon garden. In 1958 up to three redwings frequented The Paragon lawn between 23 and 26 January, thirteen flew south near the Prince of Wales Pond at 07.45 GMT on 26 February, others were heard passing over at night in late October and early November, and two flocks of about twenty flew north over the Heath on the foggy morning of 12 November.

Mistle thrush *T. viscivorus*: This was not a bird I would have expected to see on my balcony, but on 20 June 1953 one not only came there to feed but it hopped into the Potter trap I had put out in the hope of doing some ringing. The trap was unbaited, so it is hard to see why it entered. The door did not fall on this occasion, but on 25 June the thrush was trapped and ringed. A ringed bird, almost certainly the same, was back within two days. It came again in mid-February 1954, after an absence of nearly seven months, and again in March and May. On 16 May it was accompanied by its mate. On 18 January 1955, during a period of hard frost, there was an unringed bird on the balcony parapet, and two birds, one ringed and one unringed, were seen on the balcony during March. The pair bred nearby. A family partly with at least two juveniles was seen in the garden on 1 August 1955, and young were also seen in June and July 1956, in May and June 1957, and in August 1958. Mistle thrushes were occasionally noticed on the Heath, and not only near The Paragon. Flocks were encountered in August and September. In 1955 six flew low over the garden on 15 August, nine appeared in trees on the lawn on 26 September, and 22 flew over The Paragon on 9 September. In 1956 there were eight on the lawn on 16 August, five on the south-west corner of the Heath on 23 August and, on 8 September, ten on the Heath near The Paragon and, later in the day, a small flock in the garden.

Whitethroat *Sylvia communis*: Mention has already been made of the whitethroats that inhabited the 'wild' area behind The Paragon and in Pond Road in 1953, and the successful breeding that took place. In subsequent years the species was mainly heard on passage, but song was heard on the bomb-site by Colonnade House in July 1955 and in June and July 1960, in the garden of The Paragon in July 1956, and in the grounds of Morden College in June 1960.

Garden warbler *S. borin*: A bird in the undeveloped areas behind The Paragon on 2 August 1953 was the only one recorded.

Blackcap *S. atricapilla*: Blackcaps were heard singing in 1953 in a garden in Morden Road Mews on 11 and 12 May, and in the undeveloped part of The Paragon garden in May, June and early July. None was recorded in subsequent years.

Chiffchaff *Phylloscopus collybita*: Song was heard annually over the period 1953 to 1958, but mainly in September. Birds frequented The Paragon garden, the grounds of Morden College and the bomb-site by Colonnade House. One was singing at the last site on 29 August 1961.

Willow warbler *P. trochilus*: Willow warblers were heard more often than chiffchaffs and were recorded in every year from 1953 to 1958 from behind The Paragon, in or near the grounds of Morden College and, on 6 May 1956, on the bomb-site by Colonnade

House. In the spring of 1957 song was heard on fifteen dates between 16 April and 13 May. An immature bird visited my balcony on 8 August 1953.

Goldcrest *Regulus regulus*: On an unfortunately unrecorded date in early October 1954 a bird was brought to the flat which had flown through a window in Brigade Street. It had received no food since it had been captured in the morning, the birdseed it had been offered by its well-intentioned rescuer having of course been ignored. An attempt was made to give it small flies but it died in the evening. Its skin was presented to the London Natural History Society. On 16 February 1958 a female was seen in the hedge of a front garden in Morden Road Mews.

Spotted flycatcher *Muscicapa striata*: One feeding a fledgling in the garden on 2 August 1953 was the first seen for the year. On the same day an adult was seen feeding a fledgling by the path flanking the grounds of Morden College. In 1956 an adult was noted feeding a juvenile in Kidbrooke Grove on 11 August, and one was seen in the garden of The Paragon on 4 September 1956. There were two there on 8th. On 31 August 1958 two juveniles were being fed by their parents in trees on the The Paragon lawn.

Long-tailed tit *Aegithalos caudatus*: On 3 October 1957 I saw three in flight in the garden.

Coal tit *Parus ater*: Coal tits were scarce residents, seen or heard over the period 1953 to 1957 around The Paragon, in the grounds of Morden College and in Morden Road, Blackheath Park. Although birds were frequently recorded during the breeding season I obtained no proof of nesting. On 17 September 1957 one alighted on the parapet of the flat.

Blue tit *P. caeruleus*: Blue tits were common residents throughout the years 1953 to 1958. The only breeding record I had was of an adult feeding a brood of four near The Paragon on 9 June 1955, but K. H. Hyatt (*in litt.*) informs me that blue tits regularly bred in a nest-box in a tree at 3 Kidbrooke Gardens. Birds visited my balcony in December 1953, February and April 1954, September 1955 and April 1957, and there was some evidence of a movement through the area in September 1955.

Great tit *P. major*: I became so accustomed to the presence of this species around The Paragon in March 1953 that I neglected to keep detailed notes on it thereafter. It was a common resident.

Jay *Garrulus glandarius*: Whereas my records of the last two species are shamefully incomplete, I conscientiously recorded every jay seen or heard. They were often found in The Paragon garden; in 1953 one to two were noted there on twenty-three dates between April and November. In September 1955, 1957 and probably other years, a holm oak *Quercus ilex* proved an attraction. Two were seen taking acorns on 20 September 1957, and a holm oak in Baizdon Road also drew their attention in November. A family living in No. 1 The Paragon reported finding a young jay in early August 1955, and I suspected the presence of young in the garden on 14 July 1956 because of the noise the birds were making. Jays were also seen or heard in the grounds of Morden College, and seen flying over the Heath, the Village and the railway station. On 8 October 1955 one perched on the gable cross of All Saints' Church and on 5 October 1957 one alighted on the chancel gable of that building. One briefly settled on my balcony parapet on 16 September 1955, and on 26 June 1957 one peered through the kitchen window.

Magpie *Pica pica*: One that was seen with jackdaws in the grounds of Morden College on 28 December 1965 was presumed to have been an escaped or liberated pet; magpies were not established in the London suburbs at this time. My doctor, who lived in Charlton and was also John F. Burton's GP, had a passion for the Corvidae. He kept a number of corvids, including magpies, some of which roamed the neighbourhood. K. H. Hyatt (*in litt.*) saw a magpie flying south over Kidbrooke Gardens on 31 October 1953.

Jackdaw *Corvus monedula*: Jackdaws were breeding in Greenwich Park and I strongly suspected them of doing so in the grounds of Morden College, towards which, on 12 May 1953, I saw one flying with a full food pouch. A family of three was seen on the east side of the Heath on 29 June 1957, an adult feeding a young bird. Juveniles were also seen in August 1960. Only on one occasion did I see more than 20 birds on the Heath between April and October. That was on 17 August 1958 when 23 were scattered over a fairly wide area. Grant's belief that the resident population was augmented in winter is supported by my records. Grant found 25–30 birds present on the Heath and in Greenwich Park on 14 January 1966. I saw 26 on the Heath on 26

February 1957, 38 on 1 January 1958, 24 on 22 February 1958, 35 on 31 January 1959 and 28 on 16 December 1961.

Carrion crow *C. corone*: Grant recorded 40 on the Heath and in Greenwich Park on 15 January 1966. I never saw as many. I counted 18 on the Heath on 16 September 1958, 17 on 6 September 1957 and 16 on 15 April 1956. Eight to eleven were often recorded. From the flat I was able to watch a bird on a nest in a tree in Blackheath Park in the spring of 1953. This nest was also occupied in 1954, and in 1956 a new nest was built in the same tree and used in that year, in 1957 and again in 1958. Juvenile crows were seen around The Paragon in 1953, 1955 (one on my parapet on 29 July), and in 1960.

Starling *Sturnus vulgaris*: Starlings were always about The Paragon, feeding on the lawn or in the garden and resorting to the balconies for scraps. One or two birds were often seen on my balcony, and one was caught and ringed. I also ringed birds that entered the flat via the chimney, two in 1954 and two in 1955. Ringed birds visited the balcony on a number of occasions, and were seen in the garden in 1958. Several pairs nested at The Paragon, making use of broken ventilators and other holes, and a pair at No. 2 used a hole from which an overflow pipe projected. This opening gave the starlings access to the space below my bath, and it was possible to hear every sound made at the nest when one was in the bathroom. By early May the cries of the young could be heard all over the flat. This nest was occupied annually from 1953 to 1957.

Large flocks fed on the Heath. On a tour of the entire Heath on 14 August 1957, between 06.45 and 07.45 GMT, I counted 780 +, with the largest flocks numbering c.400, 86, 58, 56 and 50. There were other occasions when I only counted the birds on part of the Heath. On 14 July 1953 220 + were feeding in the south-east corner of the open space, REG counted c.350 by the Prince of Wales Pond on 11 September 1955 and 380 + were feeding by St German's Place two days later. A flock of 570 + was noted on the east side of the Heath on 4 September 1957, in the late morning, and in the afternoon of 18 September 1957 I saw over 700. Grant found the greatest numbers in October, November and from mid-February to March, however, and his highest count of 1,500, made on 14 October 1964, is roughly twice my maximum figure. Flocks of starlings crossed the Heath from south-east to north-west on their way to the central London roosts, but I made very few notes of these movements. Grant observed that the birds used the trees round the pond and in the Wilderness in Greenwich Park as a staging-post in the mid-1960s, and the Wilderness was certainly being used as such in September 1957. I also neglected to make detailed observations of visible migration in this species, although westerly and north-westerly movements were noticed on 25 October 1953, 4 November 1954, 27 October 1955 and 19 October 1958.

House sparrow *Passer domesticus*: Sparrows were frequent visitors to the balcony and over the years 1954 to 1956 I trapped and ringed sixteen. I noticed large flocks feeding on the seeding grasses on the Heath in 1953, but unfortunately made no counts. On 9 September a flock of 350 + was feeding near The Paragon. In 1955 I counted 104 with starlings in that same area on 15 September. REG saw 50-75 by the Prince of Wales Pond on 11 September. The flocks were apparently larger in August than in September. I noted several large gatherings in the last week of August 1956, with 120 + near the Prince of Wales Pond on the 28th. On 14 August, when I covered the whole of the Heath, I saw about 450 birds, including one flock of 78 and another of c.240. I have always considered these late summer gatherings on grassland within the built-up area to be the urban equivalent of the rural habit of moving to the cornfields.

Chaffinch *Fringilla coelebs*: Chaffinches were heard singing in the grounds of Morden College and in other places around The Paragon. Not a single chaffinch was ever seen on my balcony, which is surprising in view of the frequency with which this species appears at bird-tables and picnic sites. On 24 July 1953, however, a cock was seen feeding round the back door of Flat 1 of my section of the crescent but at ground level. Chaffinches were occasionally noted on passage. I saw 30 flying past the building, heading south-east over Blackheath Park on 24 March 1956, eleven flying over westwards on 28 October 1956, and there was the large north-westerly movement of 19 October 1958 already mentioned. I witnessed little of this over the Heath — a mere twelve birds seen while going to and returning from Greenwich Park — but while in the Park I counted 161 passing over between 09.50 and 12.22 GMT, and these birds would have flown over the Heath.

Brambling *F. montifringilla*: A cock was seen on ground that was being reinstated between Hare and Billet Road and Eliot Road on 31 March 1953. Ten appeared in

Morden College grounds on 30 January 1960, on which day P. C. Tinning and I also saw eight in Greenwich Park.

Greenfinch *Carduelis chloris*: Although greenfinches were heard singing from the grounds of Morden College and elsewhere around The Paragon they appeared to be rather scarce. One sang from the balcony of the flat next door (Flat 6, No. 1) on 26 June 1954, but I did not see any on mine. Two young birds were seen in the garden of Paragon House on 7 July 1953.

Goldfinch *C. carduelis*: This species appeared to be well established, not only around The Paragon, but also around Blackheath Station and to the south of Blackheath Hill. Juvenile birds were seen in the last locality on 20 August 1954. On 21 August 1955 eight to ten noisy goldfinches were seen in Kidbrooke Grove, to the east of Morden College, the party including some young being fed by parents. On 5 September 1957 there were eleven or twelve in The Paragon garden feeding amongst *Cosmos* sp. At least four were greypates begging for food. A charm of 15 was seen on the lawn on 18 March and in the garden on the 21st.

Linnet *C. cannabina*: This was the only heathland species that remained faithful to Blackheath despite the transformation of most of it into an urban green desert. I recorded linnets in every month except November and December, when I may well have overlooked their presence. Grant saw birds on the Heath in November 1966. A nest with two eggs was found by REG on 3 May 1954 in a yew *Taxus baccata* hedge behind the war memorial in the south-east corner of Greenwich Park, very close to Vanbrugh Pits, that part of the Heath where gorse and other heathland vegetation survived. It was unfortunately deserted by 25 May. In 1957 at least two pairs frequented the gorse of Vanbrugh Pits and a hen was seen taking lining material to a nest on 19 May. Two eggs had been laid by the 22nd and the hen was sitting on 2 June. This nest may have been successful. Breeding also took place elsewhere in 1957. A family party of about six was flushed from the railway embankment in Blackheath Park on 4 July. Flocks were frequently seen on the Heath, often settling on sandy patches on the football pitches, perhaps to pick up grit. Parties of up to 30 were common, but much larger flocks were seen in March and April, probably indicating passage through the area. In March 1954 150 + were seen on the Heath on the 4th and 99 on the 9th, and in 1960 there were 50–55 there on 8 March and 68 on The Paragon lawn on 12 April. On 18 April the birds on the lawn numbered *c.* 80 at 06.50 GMT and *c.* 40 were present in the evening. In the early 1980s I was to see similar flocks in March and April in King George's Park, Wandsworth (Teagle 1993). At Blackheath there were also large gatherings in the winter, e.g., 50–60 on 26 January 1958 and two parties totalling 45 on 16 February 1960.

Yellowhammer *Emberiza citrinella*: On 25 March 1954 REG saw a cock in flight near General Wolfe Road, shortly after a small flock of linnets had passed.

Other vertebrates

Hedgehog *Erinaceus europaeus*: This must have been common in the area, but I have very few records. I found a hedgehog in the garden of The Paragon on 3 July 1957 and one was seen there in mid-October 1959 by one of my neighbours. J. F. Burton encountered one on the pavement in Mycenae Road on 1 April 1959, and my near neighbour, K. H. Hyatt, saw one crossing his lawn in Kidbrooke Gardens on 10 June 1963. A note in his diary that it was the first for the year indicates that they were seen in other years.

Bats spp. A large to medium-sized bat with a strong rapid flight was seen flying over and around the tall trees behind The Paragon at dusk on 7 August 1959 at about 20 metres and occasionally plunging in a steep dive to about half that height. On 1 May 1950, before I moved to Blackheath, K. H. Hyatt saw small bats, possibly pipistrelles *Pipistrellus pipistrellus*, by the Prince of Wales Pond.

Fox *Vulpes vulpes*: Although a fox made a brief appearance in Greenwich Park in 1944 and Fitter (1949) mentions one that was shot there in January 1947 after killing a goose, it was not until the 1960s that this mammal really became established in Blackheath. I did not see or hear any when I was living in the area, although Greenwich Park was certainly being frequented in 1961 and 1962 and more birds were being killed (Teagle et al. 1964). I was able to mention the presence of foxes in Blackheath (Teagle 1967) in the 1960s largely through reports received from Miss J. R. Damon. She visited a lady who had been secretly feeding them in her garden from 1960 onwards, in a road appropriately named Foxes Dale. From 1963 onwards Miss Damon found more evidence of foxes in the neighbourhood, a sighting in Blackheath Park, tracks in the

snow on the playing fields there, and rubbish strewn about that had been removed from litter bins. Foxes frequented the grounds of the Junior House of Blackheath High School in Morden Road and those of an old people's home in Blackheath Park (the road). At the latter locality the results of litter scavenging caused a good deal of resentment. By the beginning of the 1970s foxes were becoming conspicuous. Some were encouraged, others were shot.

Grey squirrel *Sciurus carolinensis*: I did not observe any grey squirrels at Blackheath while living there between 1953 and 1961. This is remarkable because by that time there was a thriving population in Greenwich Park. Shorten (1954) was informed that they were absent from the Park in 1945, but they were certainly present in 1950 (Teagle 1963) and Burton (1962) saw them there on several occasions between 1951 and 1958. Burton makes no mention of their presence in Blackheath, but K. H. Hyatt (*in litt.*) does recall seeing them, and his mother, Mrs I. M. Hyatt, reported one in St German's Place on 28 August 1962.

Indian giant squirrel *Ratufa indica*: In January 1960 I was called out to identify what was thought to be a pine marten *Martes martes* which had been living in a garden in Lee Road for about seven weeks. It proved to be an escaped giant squirrel. The animal, which had built a drey high up in a beech *Fagus sylvatica*, was trapped alive and sent to the LCC Children's Zoo at Crystal Palace.]

Smooth newt *Triturus vulgaris*: In 1953 I saw newts in a bowl in a neighbour's house and was told that they had come from the pond in Pond Road. Several were found in The Paragon garden in 1957, mostly under bricks. K. H. Hyatt (*in litt.*) informs me that newts inhabited his garden pond at 3 Kidbrooke Gardens during the period under review.

Common toad *Bufo bufo*: Toads bred in the Prince of Wales Pond. I saw children catching them there in March 1957 — and returning them to the water having apparently received parental disapproval. Road casualties were noted by the pond and at The Paragon. One toad was found swimming in an emergency water supply tank in the garden on 9 July 1954 and one had to be rescued from the basement area of Nos. 3/4 on 28 April 1958. Toads occurred in the garden of 3 Kidbrooke Gardens (K. H. Hyatt, *in litt.*).

Common frog *Rana temporaria*: I had no personal records of frogs, but K. H. Hyatt tells me that these were also present in his garden and bred in his pond.

Three-spined stickleback *Gasterosteus aculeatus*: Sticklebacks occurred in the Prince of Wales Pond, where I saw children catching them in May 1957. They also inhabited Folly Pond. I remember that there, during one hot summer (probably that of 1959), they were concentrated in a small puddle on the mostly dried-up bed of the pond. This too evaporated in time and the pond became a dusty hollow. Eventually, of course, it was reflooded and to my surprise it again had a population of sticklebacks!

Blackheath in 1996

I made a return visit to Blackheath in the company of P. C. Holland on 29 May 1996. We toured the roads where house martins nested in the 1950s and 1960s and the results were disappointing. We found only a few unoccupied nests and the remains of nests in Royal Parade, Southvale Road and Talbot Place, and there was no sign of any past activity in Wemyss Road, Montpelier Vale or Brigade Street. No birds were seen in the immediate neighbourhood of these roads, although a few were seen over the Heath. With the return of the house martin to several localities in the London suburbs and their establishment in Inner London (Cramp and Gooders 1967) one might have expected an increase in the Blackheath breeding population. The weather in May 1996 was admittedly poor and this might have delayed nesting. I planned to make another visit during the summer but unfortunately I had to abandon the idea at the very last minute. P. C. Holland very kindly went for me on 28 August, and he found only one nest, apparently unoccupied, in Southvale Road. This could suggest human interference. House martins are not always popular with householders and nests are often deliberately destroyed. On our May visit, however, it was satisfying to see that swifts still frequented the area.

On that May visit I noticed other changes. My former bedroom window now looked towards the intrusive tower of Canary Wharf on the Isle of Dogs. The

management of the Heath, once the responsibility of the London County Council and its successor, the Greater London Council, was now being administered by the London Boroughs of Greenwich and Lewisham. Certain parts had, of course, been set aside for organized games, but others had been designated areas of ecological interest. Some of the latter, on the east side of the Heath, were level expanses of unmown grass where sheep's sorrel was quite abundant and other species included hedge bedstraw *Galium mollugo*, bulbous buttercup *Ranunculus bulbosa*, common mallow *Malva sylvestris* and common bird's-foot-trefoil. At Vanbrugh Pits, still the 'wildest' part of the Heath, forty-five species of vascular plants were noted. Many of these were ruderal species, of course, but there had been an increase in the amount of gorse. Other species typical of sandy, heathy areas noted at Vanbrugh Pits in May 1996 were sheep's sorrel (in abundance) and squirreltail fescue *Vulpia bromoides*, the latter spotted by P. C. Holland. A whitethroat was heard singing and my companion also heard a willow warbler, a species I can no longer hear. To find both these birds present at the end of May was very encouraging.

Vanbrugh Pits had unfortunately suffered some fire damage and some of the slopes were badly eroded. Rhind (1987) shows a photograph of cyclists causing erosion here in 1982. Regrettably, such things are to be expected in a built-up area.

On our May visit we noted the presence of the undesirable New Zealand pigmyweed or swamp stonecrop *Crassula helmsii* in Folly Pond, but on 28 August P. C. Holland was pleased to discover that the Hare and Billet Pond had been planted with flowering-rush *Butomus umbellatus*, greater spearwort *Ranunculus lingua* and bogbean *Menyanthes trifoliata*. He found plenty of buck's-horn plantain on the edge of Church Field. Lewisham Parks Conservation Officer, B. F. Bligh assures me (*in litt.*) that wood sage still occurs, but that the harebells have 'recently finally disappeared'. Other plants of interest mentioned by Mr Bligh are knotted clover *Trifolium striatum*, bird's-foot *Ornithopus perpusillus*, common stork's-bill *Erodium cicutarium*, sand spurrey *Spergularia rubra* and the alien buttonweed *Cotula coronopifolia*. A comprehensive list of the plants of the Heath is held by the London Ecology Unit.

Conclusion

A naturalist born in a rural environment might not find the wildlife of a suburb very satisfying. I had lived my first three decades in grim, grimy, densely built-up parts of London, with only occasional excursions into the countryside, which is probably why I found the pleasant surroundings of Blackheath so exhilarating. This paper might not have been written had I not spent too long in a place where the sight of a blackbird or a blue tit in the garden was an event. I did, of course, go to Blackheath at an interesting time. It was still recovering from the impact of a world war and changes were taking place that were having a marked effect on the avifauna.

The Heath has seen many changes over the centuries, as Rhind (1987) has described in his well-researched book, and we can only guess what effects these had on the wildlife in the past. In Hudson's time, a century ago, the open space could no longer be described as a heath in the truest sense, although there must have been gravel pits that may have had something to the character of Vanbrugh Pits. Hudson wrote the place off as having little ornithological interest, but little was done in his day to encourage wildlife. Many naturalists were busy filling their cabinets with birds' eggs and skins. Finches were being caught for the 'fancy', starlings and jackdaws were caught for trap-shooting, and the gulls, which were to become such a feature of the Heath, had only just started to visit London other than in hard winters.

The present century has seen a welcome change in public attitudes and a greater interest in the natural world, but for a long time the importance of

habitat protection was not always appreciated. By the beginning of the 1950s the Parks Committee of the London County Council was seeking the advice of the Committee on Bird Sanctuaries in the Royal Parks, but as secretary of the latter committee I once had to make an urgent telephone call to the Deputy Chief Parks Officer of the LCC to stop the gorse at Vanbrugh Pits from being destroyed.

It was not until 1981 when the London Wildlife Trust was born that the stage was set for London's local authorities to become seriously concerned with nature conservation. Bevan (1993) outlines the growth of awareness of the importance of nature in the urban environment. It gave rise to the creation of the Greater London Council's Ecology Section, later to become the London Ecology Unit and, since 1984, the involvement of smaller local authorities. The London Borough of Lewisham has a Nature Conservation Section, which is an affiliated member of the LNHS. In the management of Blackheath it co-operates with the London Borough of Greenwich and the London Wildlife Trust. Areas that are not kept closely mown and primarily used for organized games are managed as spring or summer meadows and given two cuts a year. Use is made of local volunteers to tackle such tasks as the thinning out of pond vegetation when this becomes necessary. Blackheath is but one of twenty-one nature conservation sites established by Lewisham Council, each reserve having a management committee composed of local people and a member of the Nature Conservation Section. I wish I had been able to assist in this way when I was resident in the area.

One cannot expect Blackheath to revert to heathland, but at least one can feel satisfied that it and its wildlife are now in good hands.

Acknowledgements

I am greatly indebted to Bernard F. Bligh, Parks Conservation Officer for the London Borough of Lewisham, for answering my many queries and for contacting David Topcliffe, Environment and Landscape Officer of the London Borough of Greenwich, and Neil Rhind, chairman of the Blackheath Society, on my behalf. I must also thank him for drawing my attention to Neil Rhind's informative book on the Heath. I am grateful to Peter Holland for accompanying me on my nostalgic tour of the Heath on 29 May 1996 and for making an independent visit to the area in August to tie up some loose ends. I must thank Keith Hyatt for the notes he has extracted from his diaries, and Rosemary Damon for supplying additional information on the resident foxes. I greatly appreciate the help given by Dorothy Kerridge in preparing the maps that accompany the text, and thank my wife, Joyce, for checking the typescript for errors and for putting up with the untidy spread of books, maps and papers that lay around for several weeks. Lastly, I have to thank Rosemary Parslow who, as REG and RET, contributed so much of value to the section that deals with the birds of the area.

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Book review

New flora of the British Isles. Second edition. Clive Stace. Cambridge University Press. 1997. xxx, 1130 pp. £28.95, US\$85.00. ISBN 0 521 58933 5 and 0 521 58935 5, soft plastic covers.

The first edition of Clive Stace's mould-breaking flora was reviewed by me in *The London Naturalist* 71, page 116 (1992). This review will concentrate on the changes introduced in the second edition, which are summarized in a separate Preface.

What will immediately strike the eye of readers familiar with the work is that camera-ready copy has been replaced by computer text preparation. This will surely be regarded as a point in favour of the new edition, but Professor Stace is disingenuous in claiming that this has made a reduction in the number of pages needed, as the page size and in consequence the overall weight of the book have been slightly increased.

The many additional taxa will hardly be noticed by the majority of users of the new edition. *Centaurea macrocephala*, 'in an abandoned orchard in East Suffolk since 1985', can serve as an example of a plant which at present only marginally seems worthy of inclusion, but which the author cannot risk leaving out of his keys. Perhaps a future edition can have smaller type for uncommon aliens.

Few users are going to be much bothered by the addition of chromosome numbers or the new standardization of authority name abbreviations, but the provision of a full index (by Gwynn Ellis) of names of all plants covered, down to subspecies, and of all English names, is a great improvement. For the first time too, it can be used as an index of figures. It is difficult to assess the accuracy of the claim (in the Introduction) that 'Some sort of illustration is provided for over half the taxa treated', and difficult to assess the improved provision of illustrations when the numbering of them in both editions is not consecutive (Ed.2 has FIG. 4, 8, 12, 15, 19, etc.). There are new drawings of representative species of *Rubus*, *Taraxacum* and *Hieracium* on eleven pages. Five pages of drawings of *Euphrasia* (by Olga Stewart) replace two pages of unsatisfactory photographs, and photographs of poor specimens of *Schoenoplectus* glumes have also been replaced by drawings. Another very welcome new feature is the collection of photographs of leaves of all species of *Cotoneaster* treated, the number of which has gone up from 45 to 68! There is a similar treatment of *Berberis*. The drawing of the fruit of *Papaver atlanticum*, which was quite wrong in the first edition, has been changed.

If you enjoyed using the first edition, it is well worth paying for the upgrade. Do not look in it for signs that comments on the first edition have induced Professor Stace to modify his opinions in any way.

RODNEY BURTON

The Hymenoptera of Mitcham Common: the fauna of a south London grass heath, with comments on the use of site quality scores for site evaluation

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Contents

Summary	105
Introduction	105
Site description	106
Vegetation	107
Administration	110
Scope and extent of biological recording	111
The records	112
Interpretation	112
A London context	118
Acknowledgements	119
References	119
Appendix 1 — Hymenoptera: Symphyta and Parasitica from Mitcham Common ..	120
Appendix 2 — Hymenoptera: Aculeata from Mitcham Common	122

Summary

The aculeate Hymenoptera fauna of Mitcham Common is described and analysed using current site quality indices. This demonstrates the value of such indices in smoothing out recorder bias, but raises questions about the value of such indices for site evaluation without taking account of factors such as suitable habitat which would not normally be identified as important by botanical evaluation. Furthermore, the relative richness of homogeneous and varied sites suggests that evaluation using site quality scores may disadvantage homogeneous sites in some instances. This paper also demonstrates the entomological interest of the Thames Basin gravels in south London and highlights the need for more extensive survey of the remaining resource; it also identifies the need to manage for strengths such as the invertebrate interest because species-poor acid grassland is an otherwise under-valued resource. Species lists for known assemblages of parasitic Hymenoptera and sawflies are also appended, but owing to the paucity of knowledge of these groups, the data are not analysed. The overall species lists of Hymenoptera for Mitcham Common comprise 252 species and include 182 Aculeata, 57 Symphyta and 13 Parasitica. Both the lists for the Aculeata and Symphyta are significant in a London context and possibly nationally; the list for parasitic species is limited and could be expanded considerably.

Introduction

Dry acid grassland occurs on a variety of sands, gravels and pebble beds in the Thames Basin. Typically, the community comprises bents *Agrostis* and fescues *Festuca* species, but may also include mat grass *Nardus stricta*, common quaking-grass *Briza media* and wavy hair-grass *Deschampsia flexuosa*; in wetter areas purple moor-grass *Molinea caerulea* and tufted hair-grass *Deschampsia cespitosa* also occur. Typical herbs include harebells *Campanula rotundifolia*, spiny retharrow *Ononis spinosa* and dwarf gorse *Ulex minor*, but perhaps the most characteristic and obvious species are the yellow-flowered composites such as cat's ear *Hypochoeris radicata*, hawkbits *Leontodon* spp. and mouse-ear hawkweed *Hieracium pilosella* which often abound amongst the finer grasses. Although sometimes present at low densities heather *Calluna vulgaris* is not the principal component of the grass heath community.

The most extensive acid grasslands in south London are within Richmond Park, but they are extremely species poor owing to heavy deer grazing. Elsewhere, sites are fragmented by scrub encroachment or the effects of disturbance when pipelines and other facilities are installed. Many of the best remaining examples of acid grassland can be found on golf courses such as those on Wimbledon Common, and Esher & Thames Ditton Golf Course where strips of high quality habitat can be found along the edge of the fairways. Other localities such as Barnes Common are dissected by roads and comprise relatively small fragments of interest, whilst some, such as Tooting Bec, Wandsworth and Streatham Commons, have largely been converted into urban green deserts of mown grass and lollipop trees.

Those areas of dry acid grassland that remain are becoming very precious. Without remedial action against eutrophication and scrub advance the decline is unstoppable, and there is therefore an urgent need to record the fauna and flora of the remaining examples. The Hymenoptera of grass heath are particularly poorly recorded and there are few historic accounts of this fauna. The best known site is Hampstead Heath whose aculeate Hymenoptera fauna is described by Guichard and Yarrow (1948). The records for this site stretch back to the middle of the nineteenth century and the species lists extends to well over 200; however the site has changed considerably since recording was at its peak and parts of the described site are in fact suburban gardens. The other published fauna is that of Bushey Park (Guichard 1972) which includes similar elements to that of Mitcham Common.

Accounts of individual sites tend to concentrate on the list of species together with general comments on their importance, but this is gradually changing to include attempts to place sites into context using indices of site quality, e.g., Ball (1992) and Archer (1995); such approaches need to be refined in the light of greater recording effort and application of the techniques. There are considerable merits in using such analyses to assist evaluation of the differences between sites, but there is a risk that such techniques will lead to the establishment of a mathematical score which will form the foundation for conservation management and site protection. In this account, site quality indices are used to smooth out the effects of varying recorder effort and to show that such indices can be used to demonstrate differences between sites. The reasons for significant differences between sub-sites are also considered and used to show why site scores can vary so much.

Site indices are dependent upon statuses ascribed to individual species and published indices cannot be compared with subsequent evaluations without a record of the statuses used. This is a fundamental flaw in the process and without full details of the statuses, indices should neither be used to evaluate individual sites nor to compare sites, as analyses by different workers will inevitably lead to different scores and possibly erroneous conclusions. This study also shows that where an important assemblage comprises a large number of relatively common species, the importance of the site is not properly reflected in the site quality index; this is important because such indices may be used to justify the loss of important conservation sites on account of a low score for large assemblages of bees and wasps which are among the most threatened invertebrate communities.

Site description

Mitcham Common is part of a complex of open space which includes Beddington Park and Beddington Sewage Farm (well-known to many ornithologists). This means that whilst for the purposes of biological recording Mitcham Common can be regarded as a distinct unit, it is part of a wider stretch of open land that is significant for its size and variation; a feature that is otherwise very scarce in the urban environment.

Nineteenth century aggregate extraction and twentieth century rubbish dumping mean that very little of the original open flat topography remains. Areas of former aggregate extraction left large areas of land much closer to the water table and also left a multitude of small pools and boggy places as well as extensive dry grassland which re-established on the remaining gravels. At one time the Common was of considerable interest for its wetland flora as is illustrated by the species listed by Parsons (1912), but progressive infilling and changing water-tables resulting from urbanization have led to a marked decline in the wetland flora with most of the interesting communities having long since disappeared. Indeed it is apparent from Parsons' paper that the decline had already commenced by 1912.

Until the end of the nineteenth century the grassland which recolonized after gravel extraction was grazed and was also kept open by gorse cutting for bakery kilns. Much of the site was subsequently dedicated to a golf course which contracted to its current proportions in the 1930s, after which parts of the site were turned to wartime food production and anti-aircraft defences; the last of the latter being removed as recently as the early 1960s. These factors together with frequent grass fires were responsible for maintaining the open nature of the site as it was until well into the 1960s. There is some evidence that the site may have supported tracts of heather in the past, but the extent is difficult to determine and pictures from the end of the nineteenth century (in Montague 1970) suggest that the vegetation was essentially grass heath with gorse. Without grazing pressure, thorny scrub has invaded the fine grasslands on remaining gravels and in places has turned to woodland. Even so, there remains a patchwork of dry grasslands which provide an insight into the original plant and animal communities.

Roads dissect the site to such an extent that whilst Mitcham Common totals some 440 acres (178 hectares) these are spread over at least 17 blocks of varying sizes (Figure 1). The most intact grass heath remains on blocks A to F, but is concentrated on blocks A, E and F. Tipping, mowing and other human disturbance are responsible for the decline and grassland on other units is limited to small patches; even so, some considerable interest remains on fragmented parts of blocks B, C and D (Figure 2).

Vegetation

There is a patchwork of grasslands which appear to fall within the NVC communities U1 (*Festuca ovina*–*Agrostis capillaris*–*Rumex acetosella* grassland), U4 (*Festuca ovina*–*Agrostis capillaris*–*Galium saxatile* grassland), MG1 (*Arrhenatherum elatius* grassland) and MG9 (*Holcus lanatus*–*Deschampsia cespitosa* grassland) with a number of variants (Rodwell 1992). These grade into woodland through W23 (*Ulex/Rubus* scrub) to W21 (*Crataegus monogyna/Hedera helix*), and subsequently to W10 (*Quercus robur*–*Pteridium aquilinum*–*Rubus fruticosus*) (Rodwell 1991). Whilst widely used for conservation assessment of sites and therefore alluded to here, these community descriptions do not really convey the complex mosaic that most of the woodlands and grasslands comprise. This mosaic is fundamental to invertebrate conservation and in particular to conservation of our bees, ants and wasps. The following site description draws attention to some of the more interesting elements and historical relationships between human influences and the extant plant communities.

The better examples of typical acid grass heath comprise tussocky fescue *Festuca rubra/ovina* grassland with scattered bents *Agrostis stolonifera/A. canina*, yellow composites including mouse-ear hawkweed *Hieracium pilosella*, heath bedstraw *Galium saxatile*, petty whin *Genista anglica* and dwarf gorse *Ulex minor*. In places this grades into shorter sheep's sorrel *Rumex acetosella*/early hair-grass *Aira praecox* communities, but these have markedly declined in recent years, perhaps providing an indication of advancing eutrophication. Harebells

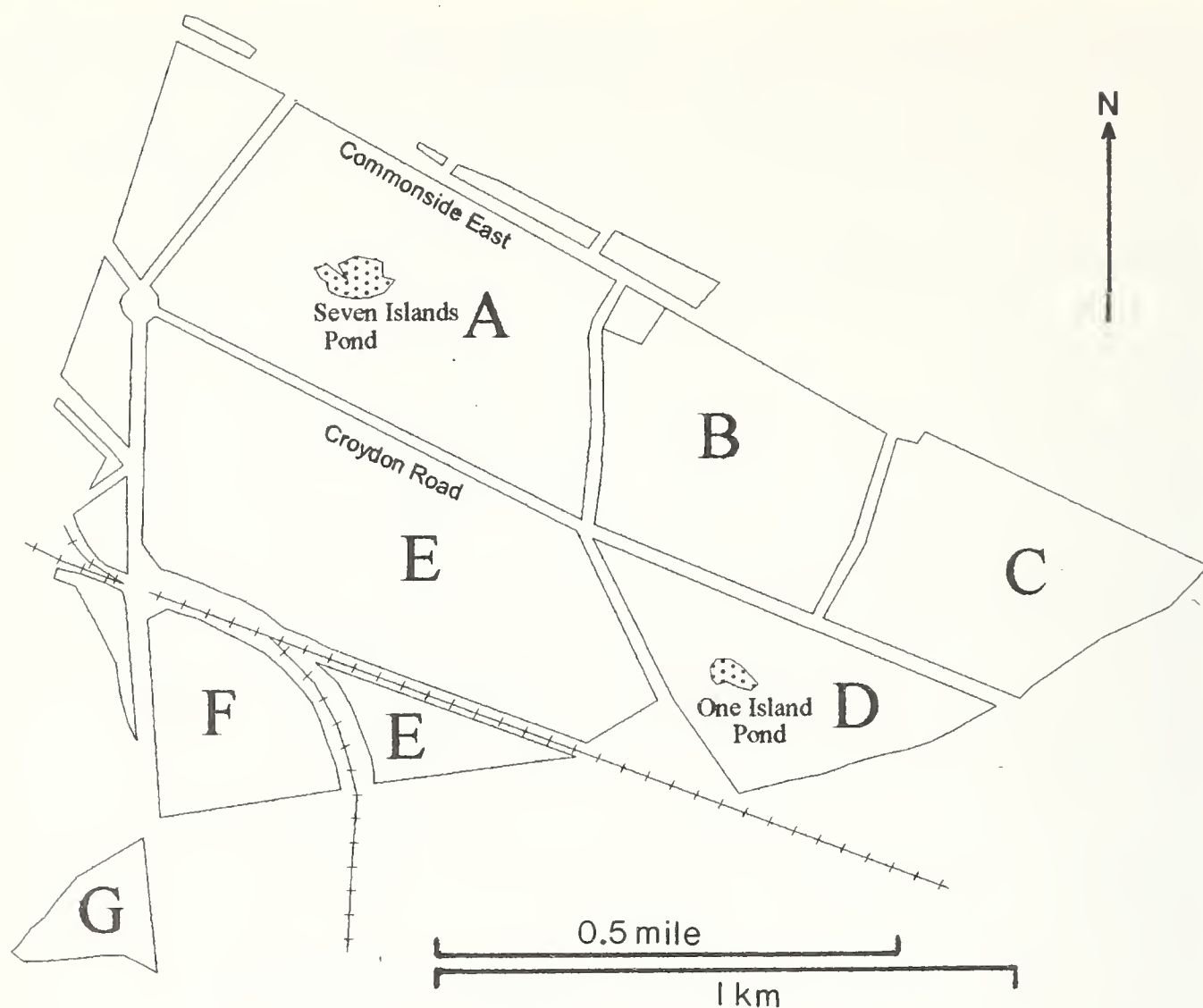


FIGURE 1. Mitcham Common showing main recording compartments.

Campanula rotundifolia were formerly abundant but are also much rarer today, as is spiny restharrow *Ononis spinosa*. In a few places heather *Calluna vulgaris* occurs as scattered clumps and appears to be spreading on parts of the golf course, possibly as a result of active management, but probably more as a reaction to changing conditions and recent drought. Within this sward local variation also includes patches of mat-grass *Nardus stricta*, and where humus is thicker small patches of wavy hair-grass *Deschampsia flexuosa* can be found. Purple moor grass *Molina caerulea*-dominated sward occurs where there have been frequent fires, but seems to revert towards *Agrostis/Festuca* communities when burning ceases. Small hollows and areas where the water table is close to the surface support tufted hair-grass *Deschampsia cespitosa*-dominated communities which include herbs such as lady's smock *Cardamine pratensis* and lesser spearwort *Ranunculus flammula*.

Anthills formed by the yellow ant *Lasius flavus* are one of the key features of dry acid grassland, but are also prominent features of grazing marsh and chalk downland. They are particularly well developed on Mitcham Common and old hills in the woodlands provide clear evidence that such woods are relatively recent. The anthills are of considerable importance for both the plants and animals by providing topographic variation and patches of particularly well-drained soil. Anthills support a distinct flora and on Mitcham Common are the main habitat of such plants as slender St John's wort *Hypericum pulchrum* and thyme *Thymus pulegioides*. Old, dead hills are frequently excavated by animals

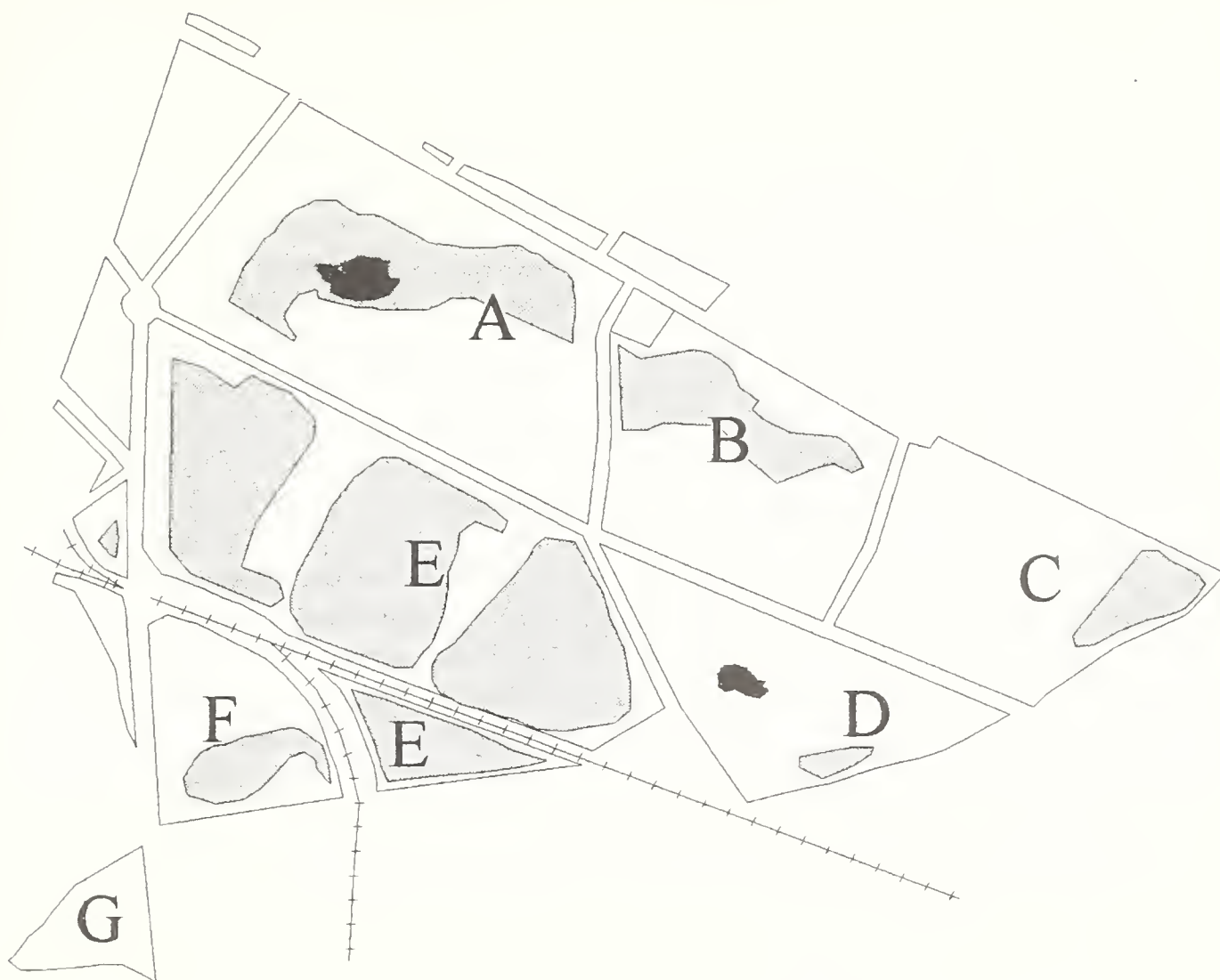


FIGURE 2. Mitcham Common showing approximate distribution of dry acid grasslands (shaded areas). Scale and direction as on Figure 1.

(probably dogs and foxes) and this creates small bare patches much beloved of ground-nesting bees and wasps (Figure 3).

Much larger areas of bare ground result from wear by visitors, and there is a network of footpaths of varying width across the site, with the larger examples including bare ground centrally grading into short turf and subsequently into longer swards. In places, the effects of eutrophication are clear if a cross-section of a footpath is examined; in such places the short turf grades into rye-grass *Lolium perenne* grassland and then into mesotrophic couch grass *Agropyron repens*/cocksfoot grass *Dactylis glomerata* communities before elements of classic dry grassland appear. In some places the edge effects are so pronounced that very little dry grassland occurs between paths. This effect is particularly obvious where dog fouling is most heavy; locations towards the edge of the site and along the major access routes onto the site are especially vulnerable to these effects.

Woody scrub principally comprises hawthorn *Crataegus monogyna*, but in places birch *Betula pendula* and oak *Quercus robur* woodland have developed independently. Most of the older woodlands are of oak with a poor ground flora dominated by brambles *Rubus fruticosus* agg. and rough meadow-grass *Poa trivialis* which clearly originate from hawthorn-dominated scrub and retain a small proportion of hawthorn understorey. The most recent hawthorn woods are dark monocultures with no ground flora, but are gradually being overtopped by oaks. One by-product of the development of woodland is the establishment of a variety of ferns such as male fern *Dryopteris felix-mas*, broad buckler-fern



FIGURE 3. Undulating topography resulting from sandhills constructed by the ant *Lasius flavus*.

D. dilatata and crested buckler-fern *D. carthusiana* which were not listed by Parsons (1912). Except for Seven Islands Pond (Figure 4) and One Island Pond, wetland is virtually absent today. The ditches on the golf course support a variety of startworts *Callitriche* spp., water forget-me-not *Myosotis scorpioides*, ivy-leaved water-crowfoot *Ranunculus hederaceus* and water plantain *Alisma plantago-aquatica*. Beds of flote grass *Glyceria fluitans* can be found in some small pools and *Juncus*-dominated communities are present where the water table is high or drainage is impeded by compaction. Patches of willow *Salix* spp. are also features of wetter areas.

Recently introduced soils support a substantially different community in many instances, with stinging nettle *Urtica dioica* beds and vast tracts of hemlock *Conium maculatum* on the nutrient-rich soils. Only on the earliest tips are there indications of reversion to grass heath with patches of fescues *Festuca* spp. or sheep's sorrel *Rumex acetosella*-dominated grassland spreading. This must be because the earliest tipping was covered with original gravel deposits. Even here, rank *Arrhenatherum elatius*/*Agropyron repens* grassland prevails together with hogweed *Heracleum sphondylium*. The most recent tips comprise rank grassland which is managed by mowing and removal of cut material, and may improve with time.

Administration

Mitcham Common is administered by a Board of Conservators who are empowered by the Metropolitan Commons (Mitcham) Supplemental Act, 1891. They comprise thirteen members representing the former parishes of Mitcham, Beddington and Croydon as well as the City of London Corporation, although the Conservators are now representatives of the modern boroughs into which former parish councils have been subsumed. The Board employ a wardening complement of four staff who are responsible for the maintenance



FIGURE 4. Seven Islands Pond with well-worn banks and short turf favoured by ground-nesting bees and wasps.

and upkeep of the land. Part of the Common is occupied by Mitcham Golf Club who maintain greens and roughs over an area of approximately 112 acres (45 hectares).

Scope and extent of biological recording

There has been a history of entomological recording on Mitcham Common dating back at least fifty years and botanical recording as far back as the nineteenth century. The comparative account of the flora of various south London commons by Parsons (1912) is a particularly valuable historical record. Further comments on the flora are offered by Lousley (1976) who suggested that the only area of biological interest remaining was on the golf course, an assertion which is refuted by the findings of this work. The late Len Parmenter recorded flies from the Mitcham/Beddington area for many years and there are occasional records of his finds in the published literature (Parmenter 1950, 1952). An unpublished report produced by a Manpower Services Commission survey in 1983/84 (Morris 1984*a*) includes lists of insects recorded by the team, including extensive lists for true bugs (Hemiptera) and Macrolepidoptera, and selected families of Diptera and Hymenoptera; the list of the latter is now known to contain errors which are noted in Appendix 2. The Macrolepidoptera are recorded in Morris (1984*b*) whilst further recording of both Macro- and Microlepidoptera is reported by Lees (1992). Substantial lists of flies, ants and wasps are provided in an unpublished report (Morris 1991). The Mitcham Common/Beddington Sewage Farm area also has a historic reputation for its bird interest; an account of the birds of the Common is given by Morris (1976), and there is a wealth of additional unpublished material available through additional recording and the Common's use as a constant effort ringing site.

This paper is based on my own recording which was most intensive in the period 1990–1992, but extends back to the late 1970s. My main method has

been hand-netting, which was augmented by a programme of water-trapping in 1990 and 1991. Although I have concentrated on particular groups, material of other groups has been retained for identification by relevant specialists. The records include elements of the aculeate Hymenoptera and Symphyta which have either been identified or checked by Mike Edwards, John Burn and Dr David Sheppard. Parasitic Hymenoptera were identified by Dr David Notton and Dr Mark Shaw.

The records

The Hymenoptera are a relatively underworked group on a national scale, at least partly because of the lack of modern literature and because they are taxonomically difficult. The lists of species recorded are included in two appendices: Appendix 1 comprises the Symphyta and Parasitica which were recorded mainly as a by-product of other work and were not systematically collected; Appendix 2 comprises the Aculeata (bees, ants and wasps) which were recorded in considerable detail over two summers, 1990 and 1991. Both lists follow the taxonomic format of Kloet and Hincks (1978), but as that list is now out of date and there have been a number of additions to the fauna, full authorship of species is given in the Appendix.

There are indications that the relatively well-known aculeate Hymenoptera are declining (Falk 1991) and that sites which support substantial assemblages are of considerable importance. In this respect, nationally important faunas are often regarded as those comprising 200 or more species (M. Edwards pers. comm.). Of all the plant and insect groups that are known from Mitcham Common, this assemblage of some 182 species is the most significant in an urban London context, but possibly not the LNHS recording area which includes areas of important heathland such as the complex of Esher and Oxshott Commons which generally support a far richer fauna.

Edwards (1996) defines a good site for bees as one which yields a species list of eighty or more after six recording visits. Such visits are likely to be far more intensive than those I made, but even so, my recording effort was probably far more intensive overall, as I spent many hours on site in 1990 and 1991. This effort yielded eighty-nine bee species, but no individual unit yielded more than sixty-one species (site A). Even so, Mitcham Common must rank among the better sites for bees in southern England.

Very little can be said of the other families of Hymenoptera occurring on Mitcham Common. The list of sawflies which currently stands at fifty-seven species is respectable, but it is likely that with more work more species will be found. So far, the most surprising record is that of *Janus luteipes* (Cephidae) which is the only post-1970 record of the species in the UK (D. A. Sheppard pers. comm.). Records of the parasitic Hymenoptera are rudimentary and would benefit from further study.

Interpretation

Ground-nesting solitary bees and wasps are well represented in the assemblage because the sandy gravels warm up more quickly than heavy clays and are favoured by species which prefer hotter conditions; often those which are at the edge of their European range. Sands and gravels are also relatively easy to excavate and drain freely, thereby providing an ideal medium for nest construction. Lenses of sand amongst coarser gravels are favoured by most species because they are easier to burrow. The most important places for nesting aggregations are patches of bare ground associated with heavy wear and this should be borne in mind by all site managers especially those considering the need to provide artificial surfaces for paths, thereby eliminating this important and often overlooked habitat.

The ground-nesting assemblage comprises some ninety-four species including two *Red Data Book* species and a further three Nationally Scarce A and eight Nationally Scarce B species. These include many readily identifiable species such as *Andrena bimaculata*, *A. tibialis* and *Lasioglossum malachurus*. Most of these species are found along the edge of footpaths, but recent wind-throw has created habitats in the exposed root plates that have been colonized by species such as *Anthophora pilipes* and its associated cleptoparasite *Melecta albifrons*, and the spider-hunting wasp *Auplopus carbonarius*. Ground nesters are widely distributed, but as Table 2 shows, they are best represented on sites A and E. One important reason for the differences is the distribution of suitable bare compacted ground and short turf on these two sites where visitor pressure is relatively high, but suitable foraging sites must be within economic distances otherwise bare ground may not be colonized. It might therefore be inferred that high visitor pressure and associated wear are at least partially beneficial to this assemblage as long as the site is big enough to support both nesting and foraging.

The two ground-nesting species in the assemblage on Mitcham Common listed as *Red Data Book 3* (*RDB 3*) (Falk 1991) are the distinctive red-and-black bee *Andrena florea* which seems to be confined to parts of site A, and the tiny wasp *Diodontus insidiosus* which can be found nesting in remarkably small patches of bare sand such as worn parts of former nests of the ant *Lasius flavus*. The nomad bee *Nomada fulvicornis* is another species listed as *RDB 3* and is associated with *Andrena bimaculata* and *A. tibialis* and can be found at low densities in suitable parts of the site such as worn sandy footpaths and sparsely vegetated banks; it is possibly more widespread in south-east England than was previously thought and may not merit *RDB* status. The ruby-tailed wasp *Hedychridium coriaceum* which parasitizes the nests of the wasp *Lindenius albilabris* would appear to be as rare as its *RDB 3* status suggests, even though it is the most abundant ruby-tailed wasp recorded from Mitcham Common. This distinctive species can be found quartering most open compacted sandy areas and is by far the most common species represented in water-traps (Table 1).

TABLE 1. Relative frequencies of ruby-tailed wasps in ten water-traps run in 1990.

Species	Number of traps recorded	Total number of specimens	Recorded by active sampling
<i>Hedychridium ardens</i>	2	3	yes
<i>Hedychridium coriaceum</i>	7	30	yes
<i>Hedychridium roseum</i>	2	2	yes
<i>Trichrysis cyanea</i>	2	2	yes

Aerial nesters are also well represented, including species such as the solitary wasp *Pemphredon morio* which inhabits old beetle workings, and *Ectemnius dives*, another solitary wasp which constructs its own chambers in timber. Dead wood is not the only habitat that this group uses for nesting and exposed dead bramble stems are important for some species of yellow-faced *Hylaeus* bees and wasps such as *Pemphredon morio*. The pithy stems of elder *Sambucus nigra* are colonized by a range of solitary wasps such as *Crossocerus capitosus*, whilst dead woody plants such as rosebay willowherb *Chamerion angustifolium*, thistles and docks also provide dry cavities for nest building. Amongst this group of aerial nesters, *Hylaeus cornutus* and *H. signatus* are particularly noteworthy and appear to be represented by robust populations. Sites which support particularly substantial assemblages of aerial nesters are those whose vegetation contains an element of the rather woody ruderal communities. This may help to explain why the ratio of ground to aerial nesters on sites D and F is more evenly balanced than elsewhere (Table 2) as both sites include a substantial element

TABLE 2. The aculeate Hymenoptera fauna of the main compartments studied on Mitcham Common. An analysis of the numbers of each family, parasitic load and nesting behaviour.

	Total species	Nesting habit			Site						
		A	G	P	A	B	C	D	E	F	G
Bethylidae	2	-	-	2	-	-	-	-	1	-	1
Chrysididae	12	-	-	12	8	4	1	4	6	5	-
Tiphiidae	1	-	-	1	-	-	-	1	1	-	-
Formicidae	8	-	8	-	5	7	3	2	7	2	-
Pompilidae	12	1	10	1	8	-	1	1	5	6	-
Eumenidae	5	5	-	-	1	1	1	4	2	2	1
Vespidae	4	2	4	-	3	2	1	1	3	1	-
Sphecidae	49	28	20	2	35	17	11	21	35	22	4
Colletidae	8	7	2	-	5	2	3	2	4	6	-
Andrenidae	28	-	28	-	18	12	10	13	18	12	2
Halictidae	17	-	13	4	10	9	8	8	15	8	-
Melittidae	2	-	2	2	2	1	-	1	-	-	-
Megachilidae	11	10	-	1	8	4	3	3	5	6	-
Anthophoridae	12	-	-	12	8	5	6	5	8	9	-
Apidae	11	1	7	3	10	7	7	6	8	7	-
Ground nesters	94	-	94	-	64	46	31	36	64	38	2
Aerial nesters	54	54	-	-	35	16	14	23	31	26	5
Cleptoparasites	36	-	-	36	25	11	9	12	24	24	-
Parasites	2	-	-	2	-	-	-	-	1	-	1
Cleptoparasitic load (%)	20	-	-	-	20.6	15.5	16.7	16.9	20.3	25.3	0
Ground to aerial nester ratio G/A	1.74	-	-	-	1.83	2.88	2.21	1.56	2.06	1.46	0.4
No. of spp. solely from one side	51	-	-	-	20	5	2	3	9	10	2
No status	4	-	-	4	1	1	-	-	2	-	1
Common	108	41	53	17	84	47	40	47	78	58	6
Local	46	9	27	10	19	14	10	16	26	19	-
Scarce B	15	3	9	4	10	5	3	4	7	4	-
Scarce A	5	1	3	1	3	2	0	2	2	3	1
Red Data Book 3	4	0	2	2	4	2	2	2	3	2	-
Total species	182				121	71	54	72	118	86	8

of ruderal communities in comparison with the amount of high quality grass heath (Figure 2) and associated bare ground.

The extensive assemblage associated with woody material means that careful consideration of exposed dead wood habitat and the presence of woody stemmed plants is necessary if the site is to retain its interest. Unlike some flies, the bees and wasps that inhabit dead wood and woody material are not normally regarded as indicators of continuity of ancient trees, but may be indicative of continuity of woodland cover. They are more mobile and hence more likely to colonize and it is equally likely that scrub habitat typical of the undeveloped countryside would also provide appropriate niches.

Some bees are associated with particular nectar sources (oligolectic) and may be good indicators of long habitat continuity. It is consequently interesting to note that the bee *Andrena fuscipes*, which is associated with heather *Calluna vulgaris* heath, survives in low numbers. Other heather associates are not present however, which suggests that the plant has been scarce for some time, if not continually. Two species, *Melitta haemorrhoidalis* and *Chelostoma campanularum* are associated with the harebells *Campanula rotundifolia* that are so typical of good acid grassland; and *Andrena florea* is associated with white bryony *Bryonia dioica* which is a woodland edge or hedgerow plant. All of these species are potential indicators of the changing fortunes of the habitat and it is very possible that those species associated with harebells will be lost very soon as the harebells are fast declining.

The main areas of interest for bees, wasps and ants are those which retain grass heath on original gravels. These areas are principally confined to sites A, E and F, with small areas of sites B, C and D of considerable interest surrounded by substantially degraded habitat. Using the site quality scoring system described by Ball (1992) and refined by Archer (1995), the comparative merits of the various units can be evaluated as shown in Table 3. This table has been prepared using the following scoring system:

Status	Status score
Common/Universal	1
Local/Widespread	2
(Regionally Notable/Occasional)	4 (not used in this instance)
Nationally Scarce	8
Red Data Book	16

TABLE 3. Site scores and site quality indices for Mitcham Common and its sub-sites.

	Whole site	A	B	C	Site D	E	F	G
Site score	432	290	163	116	160	250	184	14
Number of species*	178	120	70	54	72	116	86	7
Site quality index	2.42	2.42	2.33	2.15	2.22	2.16	2.14	2.00

*Only species for which a status is ascribed.

At the moment there are two sets of terms to describe the national distribution of invertebrates other than *Red Data Book* and Nationally Scarce species, but both have their drawbacks. I have chosen to use the terms ‘common’ and ‘local’ because they are the statuses used by the most widely used biological recording software package ‘Recorder’. Unlike Ball and Archer, I have ignored the statuses ‘regionally notable’ and ‘occasional’ respectively because as Archer (1995) rightly points out, regional notability has not been defined for all parts of England, and because species ascribed to the Archer ‘occasional’ category are not identified and available to common use, even though there are a number

of obvious candidates for the status. Once detailed distribution maps are available for all aculeate Hymenoptera, the terms 'universal' and 'widespread' as defined by Archer (1996) would be more valid, especially as Archer rightly points out that species are prone to fluctuating distributions and their status may change with time.

A number of statuses given in the species lists have been modified in the light of advice from Mike Edwards and where the 'Recorder' software gave a status of 'unknown'. For a few species, statuses have been omitted because their taxonomy is complicated and they cannot be reliably identified (M. Edwards pers. comm.). There are also a number of species whose status is left as published in Falk (1991) but is in need of review, or which possibly ought to be elevated to Nationally Scarce, which have been left alone because this is not the place to suggest modifications to statuses arrived at by widespread consultation with specialists.

If analyses are to be made using statuses ascribed given the best available knowledge, it is essential that analyses are accompanied by species lists with statuses noted in order that scores can be calculated on the same scale, or that comparative accounts recognize changing status. This is particularly important as some sites may only support species when they are undergoing expansion of range whilst other sites may have the fundamental qualities required to maintain a population during less-favourable circumstances. An obvious example of this might be the core areas on the Isle of Wight for the wasp *Philanthus triangulum* which has recently spread so extensively that I found individuals foraging on Wandsworth Bridge Roundabout in 1995 and on waste ground and in parks nearby which would hardly be considered to be prime habitats for aculeate Hymenoptera.

Using site quality scores it is clear that the differences between individual recording units are not nearly as pronounced as they appear in basic species lists. Recorder effort has a bearing on the number of species recorded and as has been noted earlier, most effort went into sites A, D, E and F. Remarkably, site E does not score as highly on the quality index as some of the other sites and the difference between this site and site A is considerably more pronounced than the species lists suggest. In fact, site E is of such considerable interest for aculeate Hymenoptera that the adoption of site quality indices to assess site interest must be called into question if used as the mainstay of site evaluation. The presence of a large assemblage of common species needs to be taken into account regardless of the absence of large numbers of uncommon species, as such species-rich sites are important in their own right.

The mathematical reason for the differences between sites A and E is that the numbers of *Red Data Book* and Nationally Scarce species found on site A are higher than those on site E, whilst numbers of commoner species are similar. Reasons for the differences between the indices for the best and poorest sites are also apparent when the available microhabitats are taken into consideration, and whereas sites A and E provide large areas of bare ground and woody stems close to suitable foraging sites, the other sites are less well provided for. Table 5, which is intended to illustrate some of the options which might be given further consideration in comparing sub-sites, shows that there are important differences in the availability of bare ground on some of the poorer areas and that of aerial nester habitat is also very variable. Even when comparing relatively large units, site size may also be an important factor which cannot easily be quantified.

Turning to the specific differences between sites A and E, all of the Nationally Scarce and *Red Data Book* species which occurred on site E also occurred on site A, whereas five species only occurred on the latter: *Hylaeus signatus* is a solitary bee which seems to be closely associated with wild *Reseda luteola*, which is most commonly found in ruderal situations, especially on sites A and F where the bee has been recorded; *Andrena florea*, which is associated with

white bryony *Bryonia dioica*, could conceivably turn up on site E, but I have searched every patch of bryony on this site most assiduously and have never found the bee; *Andrena minutuloides* is part of a difficult complex of small species which may be overlooked by sampling error because of its size; *Auplopus carbonarius* is a spider-hunting wasp which seems to favour nesting sites in the root-plates of upturned trees and was only found in a small part of site A in root-plates of Lombardy poplars *Populus nigra* var. *italica* along Commonsides East; and *Priocnemis hyalinata* is another spider-hunting wasp which was only taken in water-traps and may well prove to be more widespread. This latter record demonstrates the value of including water-trapping as a valuable additional sampling technique which yields relatively high numbers of spider-hunting wasps (Table 4). A further factor in the comparatively low site quality index for site E is the lower level of soil disturbance and consequently fewer woody ruderals favoured by the aerial nesting fauna.

TABLE 4. Species of spider-hunting wasps recorded from ten water-traps in 1990.

Species	Number of traps	Number of specimens	Recorded by active sampling
<i>Priocnemis exaltator</i>	2	2	No
<i>Priocnemis hyalinata</i>	2	2	No
<i>Arachnospila anceps</i>	5	13	Yes
<i>Arachnospila spissa</i>	3	4	No
<i>Evagetes crassicornis</i>	4	15	Yes
<i>Anoplius nigerrimus</i>	1	2	No

Invertebrates require a range of features other than the presence of particular plant species. This is amply demonstrated by Kirby (1992), but those factors specific to the aculeate Hymenoptera should be reiterated because they include such features as bare ground and dead stems as nesting sites which are rarely recognized as important by ecologists. Consequently comments such as Lousley's (1976) are not applicable to the invertebrate interest of a site which may be considerably more significant than individual plant species found on a site. These factors need to be taken into account when evaluating sites and cannot easily be recognized in simple site quality indices; site analysis should therefore take account of these other factors as they will be significant in identifying the potential of less-well-recorded sites as well as helping to explain differences between sites.

In an attempt to test these observations I have suggested a range of site features to be taken into consideration when sub-sites are compared and have compared the various sub-sites of Mitcham Common incorporating subjective assessments of important features expressed as a DAFOR scale.

The evaluation in Table 5 helps to explain some of the differences between individual sub-sites, and in particular helps to explain why site E fails to score as highly as site A. Unlike site A, site E scores poorly on the presence of ruderal communities and has yielded far fewer of the specialist species. The poorer scoring sites (B, C, D and G) also seem to be deficient in one or more of the various attributes and also specialist species.

Site evaluation using subjective assessments of the quality of available habitat is again open to criticism, but if used as one element of site interpretation may have useful applications. For example, it may help to explain differences between site indices for different parts of a site, or to identify specific management action needed to promote the interests of invertebrate communities. In relatively homogeneous sites or site units, however, there should be added weight given to the value of maintaining homogeneity and a representative fauna. Doubtless, similar matrices could be assembled for other groups such as

TABLE 5. Evaluation of sample sites using habitat features favoured by aculeate Hymenoptera.

Attribute	Site						
	A	B	C	D	E	F	G
Bare Ground*	5	3	4	3	5	3	2
Aerial nester habitat*	5	5	3	5	5	5	2
Large dead trees or timber in sunny locations*	4	3	2	3	4	4	1
Ruderal plant communities*	4	4	3	4	2	5	2
Specialist associates**	6	2	2	3	3	5	0
Index of local factors	24	17	14	18	19	22	7

*Dafor Scale 1 to 5 (1 = lowest)
**Actual numbers (species) are: *Andrena florea*, *A. fuscipes*, *Chelostoma campanularum*, *Hylaeus signatus*, *Melitta haemorrhoidalis*, *M. leporina*.

flies where, for example, wet marginal vegetation, damp areas, temporary standing water and wet dead wood might be considered significant factors.

A London context

It has been demonstrated that Mitcham Common supports a very substantial bee and wasp fauna which with current levels of recording is almost as high as that for Hampstead Heath which has been studied for over a century. Guichard and Yarrow (1948) clearly show that there has been a marked decline in the fauna of Hampstead Heath as a result of pressures not dissimilar to those affecting Mitcham Common. Thus the aculeate fauna of Mitcham Common is now almost certainly as rich and is possibly richer than that of Hampstead Heath. It is probable that Mitcham Common has suffered considerable losses and may continue to do so. As there are very few published records for other parts of suburban and urban London, it is likely that there are also substantial faunas on sites such as Wimbledon Common which have yet to receive detailed examination.

The aculeate Hymenoptera are a significant part of the fauna of the London area and merit consideration in their own right when developing local Biodiversity Action Plans. This paper has identified a range of important habitat associations and should provide indications of areas where special effort is needed. Moreover, the lack of knowledge of the faunas of other London commons provides a focal point for futher audit work in order that the faunas of these fast-disappearing habitats are properly understood and if possible preserved. So far, the Thames Basin gravels have not been recognized as important in their own right given the richness of the heaths of west Surrey, Hampshire and Dorset; they are however an important resource and special emphasis on management to favour the aculeate Hymenoptera would help to ensure that their interest is maintained and perhaps establish their recognition as important invertebrate sites.

One important aspect of promoting provisions for bees, ants and wasps as part of a Biodiversity Action Plan is their close association with ruderal habitats as shown in this paper and in more detail in work by Saure (1996) who demonstrates the value of ruderal habitats in Berlin. Thus, modest improvements in provisions for bees, ants and wasps may be made by leaving recently disturbed sandy ground to revegetate naturally and indeed possibly using active intervention to create new pockets of bare ground as discussed by Edwards (1996). In this respect there may be considerable opportunities close to Mitcham Common when the former Beddington Sewage Farm is redeveloped. Projects involving the creation of sandy banks and areas rich in ruderal flowers

could allow movement of the Mitcham Common fauna into a much larger area and therefore help to ensure that the assemblage continues to survive.

On Mitcham Common itself, recent scrub control followed by removal of superficial deposits of litter and humus to reveal bare sandy soils will also have been beneficial and could perhaps be expanded upon to improve less rich parts of the site. Such work could include turf stripping where MG1 grassland has replaced the more interesting U1/U4 communities, but under no account should large areas of remaining U1/U4 grassland be subjected to such actions whilst it retains its plant interest. Other actions which might be helpful may include direct efforts to ensure that oligolectic species survive. This may include a need to seed areas with harebells for example, although there are indications that some new patches of this plant have become established on some old anthills.

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APPENDIX 1

Hymenoptera: Symphyta and Parasitica from Mitcham Common

SYMPHYTA

MEGALODONTOIDEA

Pamphiliidae

Pamphilius varius (Lepetelier, 1823)

Pamphilius sylvaticus (Linnaeus, 1758)

SIRCOIDEA

Xiphydriidae

Xiphydria camelus (Linnaeus, 1758)

A. E. Stubbs (ISR records)

CEPHOIDEA

Cephidae

Hartigia xanthostoma (Eversmann, 1847)

D. C. Lees

Janus luteipes (Lepetelier, 1823)

Cephus cultratus (Eversmann, 1847)

Calameuta filiformis (Eversmann, 1847)

Calameuta pallipes (Klug, 1803)

TENTHREDINOIDEA

Argidae

Arge cyanocrocea (Forster, 1771)

Arge ustulata (Linnaeus, 1758)

Tenthredinidae

Selandria serva (Fabricius, 1793)

Dolerus aeneus Hartig, 1837

Dolerus liogaster Thomson, 1871

Dolerus niger (Linnaeus, 1767)

Dolerus nigratus (Müller, 1776)

Dolerus puncticollis Thomson, 1871

D. C. Lees

Dolerus picipes (Klug, 1814)

Athalia circularis (Klug, 1815)

Athalia cordata Lepeletier, 1823

Athalia liberta (Klug, 1813)

Protoemphytus tener (Fallén, 1808)

Allantus cinctus (Linnaeus, 1758)

Sethomostus fuliginosus (Shrank, 1781)

Phymatocera aterrima (Klug, 1814)

Monophadnus pallescens (Gmelin in Linnaeus, 1790)

Parna tenella (Klug, 1814)

Aglaostigma aucupariae (Klug, 1814)

Aglaostigma fulvipes (Scopoli, 1763)

Halidamia affinis (Fallén, 1807)

Tenthredopsis litterata (Geoffroy in
Fourcroy, 1785)

Tenthredopsis nassata (Linnaeus, 1767)

Rhogogaster viridis (Linnaeus, 1758)

Tenthredo arcuata Forster, 1771

Tenthredo brevicornis (Konow, 1886)

D. C. Lees

Pachyprotasis rapae (Linnaeus, 1767)

Macrophya albicincta (Schrank, 1776)

Macrophya alboannulata Costa, 1859

Macrophya annulata (Geoffroy in
Fourcroy, 1785)

Macrophya duodecimpunctata (Linnaeus,
1758)

Macrophya ribis (Linnaeus, 1758)

Macrophya rufipes (Linnaeus, 1758)

Cladius pectinicornis (Geoffroy in
Fourcroy, 1785)

Priophorus morio (Lepelletier, 1823)

Trichiocampus viminalis (Fallén, 1808)

(Sclater in Morris, 1984a — det. NHML)

Hoplocampa chrysorrhoea (Klug, 1814)

Hoplocampa crataegi (Klug, 1814)

Hoplocampa testudinea (Klug, 1814)

Pristiphora alnivora (Hartig, 1840)

D. C. Lees

Pristiphora denudata Konow, 1902

Pristiphora fulvipes (Fallén, 1808)

Pristiphora ruficornis (Olivier, 1811)

Phyllocolpa leucosticta (Hartig, 1837)

Nematus bergmanni Dahlbom, 1835

Nematus lucidus (Panzer, 1801)

Nematus viridis Stephens, 1835

Pachynematus laevigatus (Zaddach &
Brischke, 1882)

Pachynematus trisignatus (Foerster, 1854)

PARASITICA

ICHNEUMONOIDEA

Ichneumonidae

Schizopyga circulator (Panzer, 1801)

Dyspetes arrogator Heinrich, 1949

Banchus volutatorius (Linnaeus, 1758)

Ophion obscuratus Fabricius, 1798

Amblyteles armatorius (Forster, 1771)

CHALCIDOIDEA

Chalcididae

Halticella rufipes (Olivier, 1790)

PROCTOTRUPOIDEA

Diapriidae

Oxylabis maculata (Kieffer, 1907)

Acanosema nervosa (Thompson, 1858)

Basalys collaris (Kieffer, 1911)

Trichopria aequatica (Thompson, 1858)

Trichopria inermis (Kieffer, 1909)

Trichopria sociabilis Masner, 1965

Trichopria verticillata (Latreille, 1805)

APPENDIX 2
Hymenoptera: Aculeata from Mitcham Common

	Status	Biol*	A	B	C	D	E	F	G
BETHYLOIDEA									
Bethyloidae									
<i>Epyris niger</i> Westwood, 1832			×				×		
<i>Bethylus cephalotes</i> Forster, 1860									×
Chrysididae									
<i>Omalus aeneus</i> (Fabricius, 1787)	Local	P	×						
<i>Omalus auratus</i> (Linnaeus, 1758)	Common	P	×		×		×	×	
<i>Omalus puncticollis</i> (Mocsary, 1887)	Scarce A	P						×	
<i>Omalus violaceus</i> (Scopoli, 1763)	Scarce B	P			×				
<i>Hedychridium ardens</i> (Latreille in Coquebert, 1801)	Common	P	×				×		
<i>Hedychridium coriaceum</i> (Dahlbom, 1854)	RDB 3	P	×	×	×		×		
<i>Hedychridium roseum</i> (Rossius, 1790)	Local	P	×	×	×		×		
<i>Chrysis angustula</i> Schenck, 1856	Common	P	×				×	×	
<i>Chrysis ignita</i> (Linnaeus, 1758)		P		×					
<i>Chrysis mediata</i> Linsenmaier, 1959		P	×				×		
<i>Chrysis rutiliventris</i> Abeille de Perrin, 1879	Local	P		×					
<i>Trichrysis cyanea</i> (Linnaeus, 1758)	Common	P	×					×	
SCOLIOIDEA									
Tiphiiidae									
<i>Myrmosa atra</i> Panzer, 1801	Local	P				×	×		
FORMICOIDEA									
Formicidae									
<i>Myrmica ruginodis</i> Nylander, 1846	Common	G	×					×	
<i>Myrmica sabuleti</i> Meinert, 1860	Local	G		×			×		
<i>Myrmica scabrinodis</i> Nylander, 1846	Common	G	×	×	×		×		
<i>Myrmica schencki</i> Emery, 1895	Scarce B	G	×	×			×		
<i>Formica cunicularia</i> Latreille, 1798	Local	G					×		
<i>Lasius flavus</i> (Fabricius, 1781)	Common	G	×	×	×	×	×	×	
<i>Lasius fuliginosus</i> (Latreille, 1798)	Local	G		×			×		
<i>Lasius niger</i> (Linnaeus, 1758)	Common	G	×	×	×		×		

POMPILOIDEA

Pompilidae

Dipogon subintermedius (Magretti, 1886)
Dipogon variegatus (Linnaeus, 1758)
Auplopus carbonarius (Scopoli, 1763)
Prionemis exaltata (Fabricius, 1775)
Prionemis hyalinata (Fabricius, 1793)
Prionemis parvula Dahlbom, 1845
Prionemis pusilla Schiødt, 1837
Agenioideus cinctellus (Spinola, 1808)
Arachnospila anceps (Wesmael, 1851)
Arachnospila spissa (Schiødt, 1837)
Evagetes crassicornis (Shuckard, 1837)
Anoplus nigerimus (Scopoli, 1763)

VESPOIDEA

Eumenidae

Microdynerus exilis (Herrich-Schäffer, 1763)
Ancistrocerus gazella (Panzer, 1798)
Ancistrocerus trifasciatus (Müller, 1776)
Symmorphus gracilis (Brullé, 1832)
Symmorphus mutinensis (Baldini, 1894)

Vespidae

Dolichovespula sylvestris (Scopoli, 1763)
Vespula rufa (Linnaeus, 1758)
Vespula germanica (Fabricius, 1793)
Vespula vulgaris (Linnaeus, 1758)

SPHECOIDEA

Sphecidae

Astata boops (Schrank, 1781)
Tachysphex pompiliiformis (Panzer, 1803)
Trypoxylon attenuatum Smith, F., 1851
Trypoxylon clavicerum Lepeletier, 1828
Trypoxylon figulus (Linnaeus, 1758)
Trypoxylon medium De Beaumont, 1945
Crabro cribarius (Linnaeus, 1758)
Crabro peltarius (Schreber, 1784)
Crossocerus elongatus (Van der Linden, 1829)

[illegible]

	Status	Biol*	A	B	C	D	E	F	G
<i>Andrena dorsata</i> (Kirby, 1802)	Common	G		×		×	×		
<i>Andrena ovatula</i> (Kirby, 1802)	Local	G	×	×	×	×	×	×	
<i>Andrena wilkella</i> (Kirby, 1802)	Local	G				×	×		
<i>Panurgus banksianus</i> (Kirby, 1802)	Local	G	×		×	×	×		
Halictidae									
<i>Halictus rubicundus</i> (Christ, 1791)	Common	G					×		
<i>Halictus tumulorum</i> (Linnaeus, 1758)	Common	G	×	×	×	×	×	×	
<i>Lasioglossum leucozonium</i> (Schränk, 1781)	Common	G	×	×	×		×		
<i>Lasioglossum calceatum</i> (Scopoli, 1763)	Common	G	×	×	×	×	×		
<i>Lasioglossum malachurus</i> (Kirby, 1802)	Scarce B	G	×	×	×	×	×	×	
<i>Lasioglossum minutissimum</i> (Kirby, 1802)	Local	G					×		
<i>Lasioglossum parvulum</i> (Schränk, 1853)	Common	G				×	×		
<i>Lasioglossum punctatissimum</i> (Schränk, 1853)	Common	G		×		×	×	×	
<i>Lasioglossum puncticolle</i> (Morawitz, F., 1872)	Scarce B	G		×					
<i>Lasioglossum villosulum</i> (Kirby, 1802)	Common	G	×	×	×	×	×		
<i>Lasioglossum leucopum</i> (Kirby, 1802)	Local	G		×		×	×	×	
<i>Lasioglossum morio</i> (Fabricius, 1793)	Common	G	×	×	×	×	×	×	
<i>Lasioglossum smeathmanellum</i> (Kirby, 1802)	Common	G	×				×	×	
<i>Sphecodes crassus</i> Thomson, 1870	Scarce B	P	×				×	×	
<i>Sphecodes fasciatus</i> von Hagens, 1882	Common	P	×				×		
<i>Sphecodes monilicornis</i> (Kirby, 1802)	Common	P	×		×	×	×	×	
<i>Sphecodes pellicidus</i> Smith, F., 1845	Local	P			×		×	×	
Melittidae									
<i>Melitta haemorrhoidalis</i> (Fabricius, 1775)	Local	G	×	×		×			
<i>Melitta leporina</i> (Panzer, 1799)	Local	G	×						
Megachilidae									
<i>Anthidium manicatum</i> (Linnaeus, 1758)	Common	A	×		×				
<i>Chelostoma campanularum</i> (Kirby, 1802)	Common	A	×		×		×	×	
<i>Osmia rufa</i> (Linnaeus, 1758)	Common	A	×	×			×	×	
<i>Osmia coerulescens</i> (Linnaeus, 1758)	Common	A	×	×					
<i>Osmia leatiana</i> (Kirby, 1802)	Local	A			×	×			
<i>Hoplitis claviventris</i> (Thomson, 1872)	Local	A						×	
<i>Megachile centuncularis</i> (Linnaeus, 1758)	Common	A	×				×	×	
<i>Megachile lignisea</i> (Kirby, 1802)	Common	A	×	×	×		×	×	
<i>Megachile versicolor</i> Smith, F., 1844	Common	A					×		
<i>Megachile willughbiella</i> (Kirby)	Common	A	×	×					
<i>Coelioxys rufescens</i> Lepeletier & Serville, 1815	Local	P	×			×		×	

Anthophoridae

[illegible]

★Biology:

A = Aerial nester

G = Ground nester

P = Parasite

Species listed by Sclater in Morris 1984a, but considered to need verification before acceptance as confirmed records:

Formicidae

Leptothorax nylanderi (Forster, 1850)

Lasius mixtus (Nylander, 1846)

Sphecidae

Cerceris ruficornis (Fabricius, 1793)

Apidae

Bombus subterraneus (Linnaeus, 1758)

Pythyrus barbutellus (Kirby, 1802)

Book review

Dragonflies of Surrey. Peter Follett. Surrey Wildlife Trust. 1996. 87 pp. £12. ISBN 0 9526065 1 8.

The wide availability and modest price of Dr Alan Morton's excellent mapping software, DMap, has given rise to a marked increase in the number of dot-map county distribution atlases, and *Dragonflies of Surrey* is the second in a series of invertebrate atlases to be published by the Surrey Wildlife Trust. It is a chunky hardbacked volume with a beautiful photograph by David Element of the nationally rare brilliant emerald dragonfly on the dust jacket. It goes on to justify its price by having ten pages of colour plates of dragonflies and damselflies which attain a higher standard than those in many field guides. There are also three pages of colour plates of breeding sites, and three pages of fascinating black-and-white photographs of fossil dragonflies to illustrate the chapter on 'Geology and fossil record' by Edmund Jarzembowski and André Nel. In short, Peter Follett has been able to call on a large number of very talented collaborators to tell the reader everything that was known in 1995 about the dragonflies of Surrey. Since 'Surrey' means the vice-county, its northern border is the River Thames, and it includes many of the best sites in the London Area. There is a full gazetteer of sites complete with grid references at Appendix 5, and Appendix 1 is a very helpful list of Surrey sites with seventeen or more species of Odonata. It is not suggested that all the seventeen species are breeding on the site in question. Indeed, there are five species listed for Great Bookham Common, which I have never seen there. Recording at the moment is very much rarity led. I am convinced that the large white areas of south London on the map for the blue-tailed damselfly are not really bereft of this exceedingly common insect. It is probably breeding quite happily in people's garden ponds, but nobody tells the recorders. I found the chapter on the 'History of Surrey recording' salutary, therefore. Four of the pioneers of dragonfly study, W. J. Lucas, A. E. Gardner, C. O. Hammond and Cynthia Longfield all worked in Surrey, but it was not until 1980 that the first attempt, by D. W. Baldock, was made at a complete survey of the county. Follett's little book makes it clear that Surrey has one of the most diverse dragonfly faunas of any county in the British Isles. His accounts of the different species are lively and well written, and I warmly recommend the book to anyone in London who wants to know where to go to see dragonflies.

RUTH DAY

Notes on the birds of Nine Elms, Inner London, in the 1970s

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Summary

Twenty-two species of birds observed in Inner London from 1974 to 1979 at the site of Nine Elms Gas Works and some adjacent premises are presented. In this area nine of the ten species recorded at an adjacent site of Nine Elms Goods Depot during a survey of the fauna and flora in 1970 (Teagle 1987) were found.

Introduction

In 1970 the site of Nine Elms Goods Depot in Inner London was visited on three late summer days by Teagle (1987) in order to record some of the fauna and flora before it was redeveloped for the New Covent Garden Market which officially opened in November 1974.

From 1974 to 1979 I visited an adjacent 16-hectare (40-acre) site (Figure 1), north of the railway, which had not been redeveloped, including land formerly occupied by Nine Elms Gas Works. Subsequently this site was also built on and is now largely occupied by Royal Mail's South London Sorting Office.

The desolate wasteland with its associated flora always attracted my attention whilst travelling by train, as it did Teagle's, particularly because the habitat with its ruined or partly demolished buildings in the vicinity of Ponton Road (National Grid reference TQ 297776) appeared to be suitable for black redstarts *Phoenicurus ochruros*. The species is a typical bird of the London Area, being closely associated with habitats such as the former City bomb-sites and various industrialized and derelict areas as outlined by a number of ornithologists, e.g., Fitter (1965) and Meadows (1970).

The study area

There was little, if any, signs of a former gas works when a closer examination of the flattened area was made. Some of the land remained bare whilst other areas revealed evidence of fly-tipping. An exhaustive survey of the flora was not undertaken, but the species included bracken *Pteridium aquilinum*, tall melilot *Melilotus altissima*, rosebay willowherb *Chamerion angustifolium*, willow *Salix*, buddleia *Buddleia davidii*, Oxford ragwort *Senecio squalidus*, coltsfoot *Tussilago farfara*, mugwort *Artemisia vulgaris* and dandelion *Taraxacum* agg. The buildings, as already mentioned, around Ponton Road, were unoccupied and in various states of dilapidation.

Method of study

During my visits, which were aimed at locating the presence of breeding black redstarts, records were kept of all birds using the site and the purpose of these notes is to document them, especially as records of the adjacent site have already been published (Teagle 1987).

My observations were made at random on twenty-three days lasting from ten minutes to one and a half hours during the six years. The site was visited, sometimes only partially, on five days in 1974 and 1975, one in 1976, seven in 1977, four in 1978 and one in 1979. The extreme dates spanned the period from 25 March to 5 September and were both made in 1977 when there was a national breeding survey of black redstarts organized by the British Trust for Ornithology (Morgan and Glue 1981).

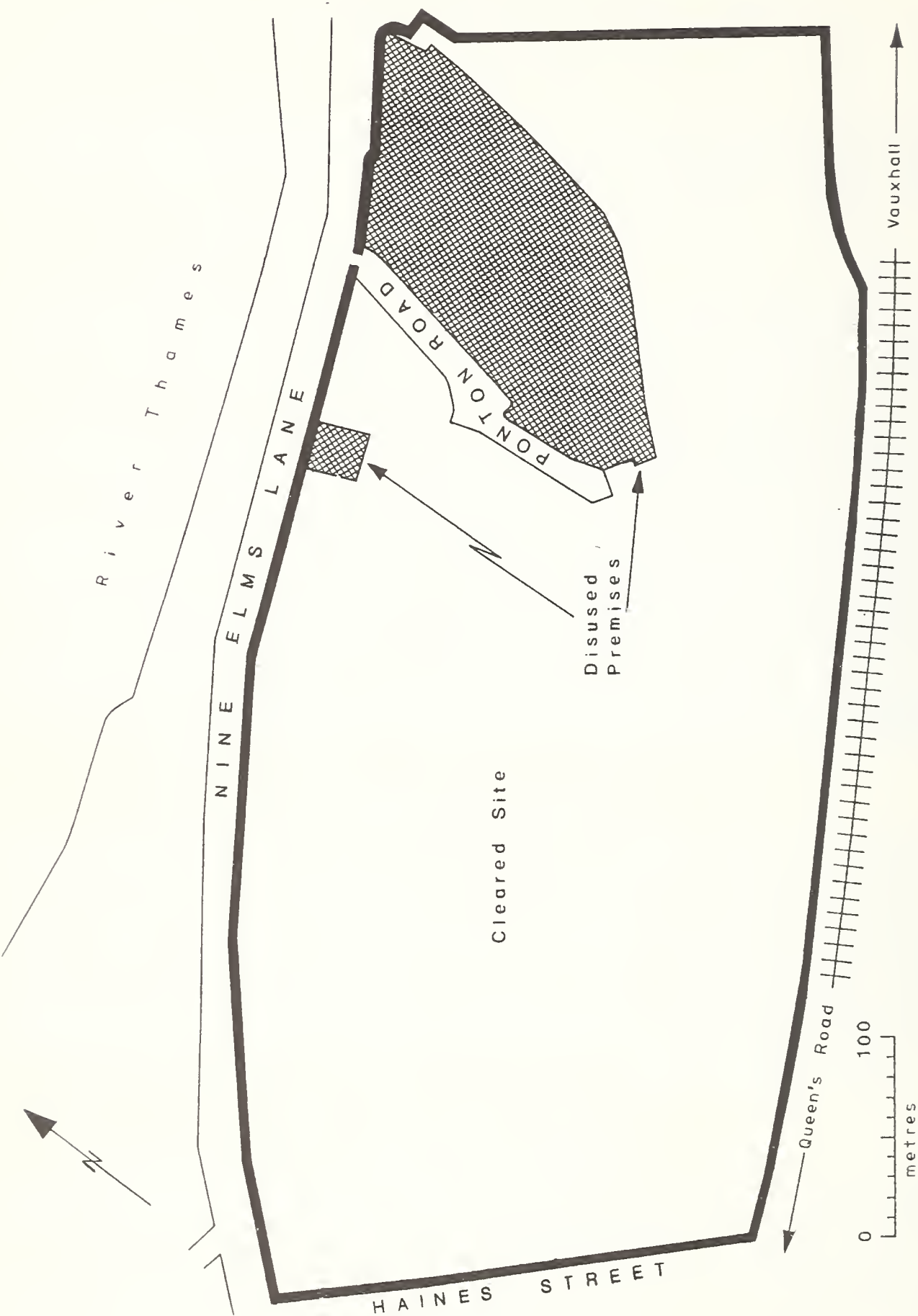


FIGURE 1. Boundary of the Nine Elms study area in the 1970s, shown by a thick black line, in relation to the River Thames and the railway.

Systematic list of birds

Ten species were recorded at the former Goods Yard site in 1970 and of these only the yellow wagtail *Motacilla flava* was not seen in the more recent years on the adjacent site. No unexpected species were recorded and the figure of twenty-two would most certainly have been increased if further visits, including some in winter, had been made.

Nomenclature follows that of *The 'British Birds' list of birds of the western Palearctic*, 1984, as used in the *London Bird Report* for 1994 (Hardwick 1995). Notes relating to the 1974 and 1979 observations follow with those recorded in 1970 shown thus *.

Kestrel *Falco tinnunculus**: recorded in each year with breeding proved on the Horseshoe Brewery (later demolished) in 1974. The presence of one or two suggested a pair had bred at or in the vicinity of Nine Elms in 1975 and 1977 and possibly in 1978. Apart from observing this falcon on the specific visits, birds were seen resting on walls near the railway or hovering at other times.

Black-headed gull *Larus ridibundus*: this is the most abundant species on the nearby stretches of the River Thames outside the breeding season, and in July 1974 numbers came to rest on open ground reaching over 200 on 17th.

Common gull *L. canus*: one on 17 and ten on 29 July 1974.

Lesser black-backed gull *L. fuscus*: one on 17 and 29 July 1974.

Herring gull *L. argentatus*: one on 17 July 1974.

Feral rock dove *Columba livia**: present but uncounted in April and June 1977 and May and June 1978.

Woodpigeon *C. palumbus**: up to six on eight days, including one in display flight on 23 May 1978.

Swift *Apus apus*: occurred on twelve days with maxima of twenty on 29 May 1975 and ten on 28 July 1978.

Swallow *Hirundo rustica*: one on 18 April 1977.

House martin *Delichon urbica*: two on 23 May 1978.

Pied wagtail *Motacilla alba yarrellii*: in 1975 six (an apparent pair and four males) on 11 April and one flying over on 23 May. A pair on 18 April and 28 June 1977.

Dunnock *Prunella modularis*: one on 2 June 1977, a singing male on 23 May 1978 and two, including one singing, on 18 July 1979.

Black redstart *Phoenicurus ochruros*: one pair bred in 1974, 1975 and 1977. A pair was present on 14 May 1976 and a singing male on 23 May and 14 July 1978.

Whinchat *Saxicola rubetra**: one on 14 May 1976.

Wheatear *Oenanthe oenanthe**: a female on 23 May 1975 and 14 May 1976 and two on 18 April 1977.

Blackbird *Turdus merula*: one pair bred in a buddleia in 1977 rearing three young that fledged in late June. In 1978 three (a pair and a female) on 23 May and a male on 14 July. One on 18 July 1979.

Carrion crow *Corvus corone**: occurred on eight days with a maximum of four.

Starling *Sturnus vulgaris**: apart from twenty on 17 and a juvenile on 29 July 1974, no counts were made in 1975, 1977 and 1978.

House sparrow *Passer domesticus**: present on most visits with about one hundred on 11 and 17 July 1974, but not counted in other years.

Greenfinch *Carduelis chloris*: three on 15 and ten on 17 July 1974, two on 5 August 1975 and 5 September 1977.

Goldfinch *C. carduelis**: present on most days with a yearly maximum of ten on 17 July 1974, eleven on 11 April 1975, about sixty feeding on thistles on 5 September 1977 and two on 14 July 1978 and 18 July 1979.

Linnet *C. cannabina*: four on 11 April 1975.

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Book review

Blowflies. Zakaria Erzinçlioğlu. Naturalists' Handbooks 23. Richmond Publishing Co., Slough. 1996. 71 pp. £15 hardback, ISBN 085546 304 X; £8.95 paperback, ISBN 0 85546 303 1.

This booklet is not simply a guide to the identification of blowflies, but a spur to investigative work.

Identification keys are provided to all the blowfly genera and species, though in some difficult genera keys are provided for males only. There is also a key to some third-instar larvae. The keys work well and the line drawings are clear and helpful. Four coloured plates are provided and although they are well executed and reproduced it is a great pity they are so small and surrounded by so much white space: they probably could have been reproduced at twice their present size.

There is very little information on distribution or abundance even though such information is promised in the early text. A few lines on each species would have been welcome.

One of the stated main aims of the booklet is to 'encourage the reader to conduct research on blowflies'. In this respect it deserves to succeed: much information on the biology of bluebottles and greenbottles is given and an up-to-date account on the state of our knowledge is provided with hints on which direction students might find fruitful in their research. The author makes it clear that much original research can be undertaken by comparative novices with simple apparatus.

The booklet concludes with a comprehensive ten-page bibliography just in case anyone should catch the bug, as it were.

D. A. SMITH

A study of the sparrowhawk *Accipiter nisus* and the kestrel *Falco tinnunculus* in an urban environment

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Contents

Abstract	133
Introduction	133
Food and feeding behaviour: Kestrel	134
Sparrowhawk	134
History and status of kestrels and sparrowhawks in Britain	135
The study area	138
Methods	138
Results	141
Discussion	146
Acknowledgement	150
References	150

Abstract

This study investigated the seasonal land-use ecology of kestrels and sparrowhawks in an urban area in south-east London from April 1994 to January 1997. The study compares the frequency of use of defined habitats and the behaviour of the two species; comparisons are also made between urban and rural kestrels and sparrowhawks.

Habitat usage converged in waste ground during September, parkland in October, and in residential/commercial/industrial-built environments during January and February (sparrowhawks solely for hunting). The diet of both species included feral pigeon *Columba livia*. This study suggests that there is less niche separation between kestrels and sparrowhawks than is typical in rural areas in terms of habitat use, prey, and hunting methods.

Introduction

The kestrel *Falco tinnunculus* is a bird mainly of open country found in the west Palaearctic east to north-east Siberia, Mongolia, and Pamir (Cramp and Simmons 1980). The availability of small diurnal mammals, in Europe mainly voles, and suitable nest sites have been shown to be important factors in determining the distribution and abundance of the kestrel (Shrubb 1993).

The sparrowhawk *Accipiter nisus*, which feeds on birds, is primarily a woodland species. Its range includes the west Palaearctic eastwards to west Siberia (Cramp and Simmons 1980). In Europe the sparrowhawk is limited in range only by its need for trees or shrubs for nesting (Newton, in Gibbons et al. 1993).

Kestrels are now familiar inhabitants of many cities, sparrowhawks however had not been regular in Inner London until 1992 when a pair bred in Regent's Park, and in 1993 also in Holland Park, the first breeding records for forty years (*London Bird Report* 57 1993, 58 1994). Little research appears to have been undertaken into the ecology of either species in urban areas.

Food and feeding behaviour

KESTREL

Kestrels feed largely on small mammals, especially grassland voles. The field vole *Microtus agrestis* and the common vole *M. arvalis* are the staple prey in Continental and northern Europe. Birds are usually secondary prey; recently fledged open-country passerines such as larks (Alaudidae) and pipits (Motacillidae) are typical. In the warmer parts of their range kestrels may rely heavily on insects and sometimes lizards (Cramp and Simmons 1980). Summarized data from a series of studies comparing different zones of Europe add that in Britain prey includes more birds than in other European areas. Birds as a percentage of vertebrates are: Britain and Scandinavia, 22 per cent; west and central Europe, 8 per cent; Mediterranean Europe, 11 per cent (Shrubb 1993). A study on the diet of kestrels in urban Manchester based on the analysis of pellets, found that birds formed 76 per cent by weight of the diet (Yalden 1980, Gilbert 1991). The kestrel is adaptable and opportunistic both in prey selection and generally (Cramp and Simmons 1980).

The kestrel prefers smaller prey but is capable of killing prey as large as adult lapwing *Vanellus vanellus* and coot *Fulica atra*, the latter weighing 500–900 grams. Male kestrels weigh 136–252 grams, females 154–314 grams (Cramp and Simmons 1980). Average daily food consumption in winter for both sexes is 60 grams (Kirkwood 1980, Masman et al. 1986, Village 1990) and for males in summer, 80 grams (Masman et al. 1986, Village 1990).

The characteristic hunting method of the kestrel is hover-hunting. It scans open ground for prey and then drops vertically, sometimes in stages before plummeting to the ground to catch its prey. This is an adaptation for hunting small terrestrial animals. Kestrels also use angled stoops and fast flight in direct attacks, usually when hunting birds, grabbing prey in trees or bushes, or in flight. Kestrels may hunt on the ground for invertebrates, feed on carrion or rob other predators of prey (Cramp and Simmons 1980). Hunting from a perch is often more frequent than hover-hunting during the winter. Hunting perches are commonly in the open; on telegraph poles and cables, buildings or trees. Kestrels sometimes cache larger prey to be eaten later (Village 1990, Shrubb 1993). Mammal and bird prey may be carried to a hillock, post or horizontal branch before feeding; birds are usually plucked first (Village 1990).

SPARROWHAWK

Sparrowhawks feed almost exclusively on birds. Typical prey of the smaller male includes woodland species such as tits (Paridae). Thrushes (Turdidae) and starlings (Sturnidae) are important prey for the female. The male, weighing 110–196 grams, regularly takes prey up to 40 grams and occasionally up to 120 grams. The female, which weighs 185–342 grams, regularly takes birds of 150 and sometimes 500 grams or more (Newton in Cramp and Simmons 1980). Sparrowhawks do not take prey species in direct proportion to their abundance, but concentrate on conspicuous and more easily caught species (Tinbergen 1946, Newton 1986). Studies on sparrowhawk diet reflect regional differences in prey availability (Cramp and Simmons 1980).

Sparrowhawks hunt in woodland, open country, around farms, villages and in suburban areas; males more in woodland, females in more-open land (Opdam 1975, Newton and Marquis in Cramp and Simmons 1980, and Brooke and Birkhead 1991). Hunting is on regular paths and generally involves surprise attack from cover on groups of small birds (Cramp and Simmons 1980). When perch-hunting, a sparrowhawk stays hidden in cover, and flies low using cover to remain unseen before seizing the victim from a perch or in flight. After some minutes at one perch it flies fast and low to another, within woodland or from one patch of cover to another (Newton in Cramp and Simmons 1980). Sparrowhawks also hunt flying low along hedgerows or other

features, weaving from one side to the other to make surprise attacks on birds (Owen 1932, Tinbergen 1946, Cramp and Simmons 1980). Techniques using soaring and flight at high altitude followed by a stoop, include direct attack on flying birds (Newton), or 'prospecting' where the bird climbs to 25 metres or more, flies straight or circles then dives to continue level hunting flight (Owen 1932, Cramp and Simmons 1980). Prospecting presumably informs the hunter of the whereabouts of prey and gives acceleration for fast hunting flight. Sparrowhawks prefer to pluck their prey on a tree stump or other low projection, a horizontal branch or old tree nest, concealed by cover (Newton in Cramp and Simmons 1980).

History and status of kestrels and sparrowhawks in Britain

Key factors affecting change in abundance of both kestrels and sparrowhawks are habitat change, game management, pesticides (particularly affecting sparrowhawks) and stocking rates.

Habitat change

A decline in farming in the late nineteenth and early twentieth centuries caused an increase of rough grassland, which is an ideal vole and kestrel habitat. This trend was reversed by the agricultural revolution during World War II. The demands of the war increased stocking rates (mainly of sheep) so reducing vole habitats. Monoculture, increased field size, and the extensive removal of hedges in the 1960s and 1970s (Pollard et al. 1974), decreased habitat heterogeneity, and with it raptor prey diversity (Joyce et al. 1988, Shrubb 1993, Newton 1986). In the uplands much rough grassland and moorland have been planted for forestry, initially providing good vole and kestrel habitat, but later becoming unsuitable (Shrubb 1993). The maturing of afforested areas has hastened the recovery of sparrowhawk populations from the effects of pesticides by providing new nesting areas (Avery and Leslie 1990).

Game management

Competitive game-hunting tallies and the improvement of firearms increased the persecution of small raptors by gamekeepers in the latter half of the nineteenth century (Shrubb 1993). The conscription of game wardens in World War II allowed increases in raptor numbers up to 1945. The Protection of Birds Act of 1954 is viewed as being largely ineffective in its goal of ending raptor persecution (Brown 1976*a*). A general increase of kestrels since 1945 however, may reflect a gradual decline in persecution by gamekeepers (Marchant et al. 1990, Shrubb 1993).

Pesticides

From 1955, catastrophic declines of sparrowhawks, especially in cereal-growing districts, were found to be the result of organochlorine pesticides which persist and accumulate in food chains. A voluntary ban on the use of organochlorines by farmers in 1962 was effective in reducing the use of the more toxic varieties, subsequently legal controls were put in place (Brown 1976*a*).

The kestrel, and other raptors which feed mainly on mammals, usually top shorter food chains. Mammals are better than birds at excreting toxins, their predators are thus exposed to lower levels of pesticides. In areas where pesticides are not used, birds which migrate and feed in other areas may still accumulate pesticides whereas mammals are unaffected. Raptors feeding chiefly on such localized mammal populations are likely to escape the effects of pesticides. Nevertheless, kestrels declined sharply in the eastern counties of England during the early 1960s (Prestt 1965, Parslow 1973), probably as a result of feeding on rats and mice which had fed on stored treated grain

(Shrubb 1993). A brief decline was also noticed in the London Area (Montier 1977). This was followed by a recovery in the late 1960s and 1970s. A similar pattern of decline and recovery was observed with sparrowhawks (Newton and Haas 1984, Shrubb 1993). The development of chemical pesticides is perhaps more significant for its effect on farming practices than for its toxic effects (Shrubb 1993).

Stocking rates

A decline of kestrel numbers in the 1980s is thought to be due largely to a decrease in Wales and western England, a consequence of the impact of high stocking rates on grassland vole populations (Shrubb 1993).

Current national status

Analysis of density data suggests that the kestrel is primarily a lowland bird, though high numbers are present in north-east England and southern Scotland. Mixed tillage and grassland farmland tends to hold the highest lowland densities (Shrubb 1993). No figures are available for urban densities. *The new atlas of breeding birds in Britain and Ireland: 1988–1991* (Gibbons et al. 1993) estimates an average of 50,000 pairs of kestrels in Britain. Ian Newton has estimated the maximum number of sparrowhawk pairs breeding in Britain annually on the basis of the provision of suitably aged woodland for nesting, and height above sea-level. The sparrowhawk is also a lowland bird. Afforestation and recovery from the effects of pesticides suggest this estimate of 32,000 pairs is now applicable (Newton in Gibbons et al. 1993).

Kestrels and sparrowhawks in urban areas

There has been a general spread of kestrels into urban areas during the past forty years (Marchant et al. 1990, Shrubb 1993). Kestrels bred in Inner London in 1931, the first record for fifty or sixty years. Increases during and after the Second World War, in the London Area as a whole, then spread to Inner London where bomb-sites provided additional open hunting areas. Five or six pairs nested in Inner London shortly after the war (Montier 1968), but numbers declined in the early 1960s. By 1972 numbers had risen, with up to ten breeding pairs (Montier 1977). A London survey in 1967 found concentrated nesting in large open areas such as the Royal Parks and commons (Montier 1968, Parr 1969, Shrubb 1993). Parr observed that the Richmond Park birds hunted over adjacent suburban gardens, possibly analogous to the clumped nesting, but widespread hunting ranges, found in upland kestrel populations (Village 1983, Shrubb 1993). No more-recent surveys of London could be found. BTO nest records show kestrels to be widespread in the industrial towns of north-west England and Yorkshire (Shrubb 1993). The *Derbyshire Bird Report* showed kestrels on the increase in urban areas in 1975 (Shrubb 1993).

The persecution of sparrowhawks has meant that they were rare near populated urban areas before World War II. A report on the birds of the Royal Parks in London for 1949 found sparrowhawks to have bred in Bushy Park and in Greenwich Park, the latter being described as an 'outstanding event' (HMSO 1950). Sparrowhawks were therefore known to breed occasionally in London at this time, but the London of 1949 was less built-up than now. Changing attitudes towards raptors in the 1950s may have made urban and suburban areas less hostile to sparrowhawks, but the effect of pesticides on the national population since the 1950s meant that significant populations had not developed in these areas until much more recently. Since the 1968–72 *Atlas* survey sparrowhawks have colonized several urban areas (Gibbons et al. 1993). Nests have been found near the centres of Bristol, Birmingham, Glasgow, Edinburgh (Newton 1986) and central London (Gibbons et al. 1993). An indication of overall population trends for both species from 1970 to 1993 is provided by Table 1.

TABLE 1. Kestrel and sparrowhawk pairs proved or probably breeding in urban and surrounding areas from 1970 to 1993.

Year	KESTREL				SPARROWHAWK				
	London	West Midlands	Sheffield	Doncaster	London	West Midlands	Sheffield	Doncaster	Edinburgh
1970	71				0		few		
1971	66				2				
1972	70		97		0				
1973	71				2				
1974	72				3	(2s)	35		
1975	92				3				
1976	75				9		37		
1977	84	29			5				
1978	77				7				
1979	73				8			1	0
1980	66				14				
1981	63	21			16	(5)			
1982	99				3				
1983	75				—				
1984*	78	21e	200e	8	31	(21)	100e	3	20
1985	74				9 ¹				
1986	74				13				
1987	68				18				
1988	72				17				
1989	97	8 ²		13	33	12		7 +	
1990*	87				87				
1991*	67				84				
1992	81				66				
1993	112	12 ²		12	93	17		18	35

s = single birds, brackets = birds present during breeding season, e = estimate.
*Sparrowhawk — high figures for London probably reflect thorough surveying for *The atlas of wintering birds in Britain and Ireland* (Lack 1986, suggested in *London Bird Report 51*: 1987), and *The new atlas of breeding birds* (Gibbons et al. 1993).
¹Departure of main Surrey contributor, hence low figure (Hardwick 1994).
²Considered under recorded, West Midland Bird Report (1990).
Sources: *London Bird Reports*, *West Midland Bird Report*, *Birds of the Sheffield area* (Hornbuckle and Herringshaw 1985), *Doncaster Bird Report*, Edinburgh (Newton 1986, Gibbons et al. 1993).

Kestrels and sparrowhawks in London

The data for Greater London (3,255 sq km of urban, suburban, water/waterside, and rural habitats) in Table 1 show a stable kestrel population from the 1960s onwards, and an increase of sparrowhawks initially from Surrey in the late 1970s and more generally from the mid 1980s. The 1993 London sparrowhawk population of 93 breeding pairs is the highest ever recorded (Hardwick 1994). Breeding sparrowhawks may now outnumber kestrels in London. Kestrels have bred regularly in urban Inner London throughout the 1970s, 1980s and 1990s (averaging about six pairs), whilst sparrowhawks have only bred since 1992 (one pair and subsequently two or three pairs) (*London Bird Reports* 1970–1994).

The study area

The study area covered approximately 1.7 square kilometres of the London Boroughs of Lewisham and Greenwich (Figure 1). The area contained five distinct habitat zones:

- A — Residential with large domestic gardens
- B — Residential, commercial and industrial
- C — Tidal riverside and adjacent industrial area
- D — Fenced-off waste ground
- E — Parkland

The characteristics of each habitat zone are summarized in Table 2.

The New Cross Gate Cutting west of zone A needs to be mentioned as the successful nesting site of sparrowhawks in 1994 and 1995, affecting the numbers of raptors seen in zone A. It has allotments to the south-east where kestrels hunted, and inaccessible, dense secondary woodland to the north and west managed by the London Wildlife Trust as a nature reserve.

Methods

Direct observation and signs of presence

Observations included direct sightings and evidence of presence. Two techniques were used; static observation and standard walks. When possible the London Ecology Unit monitoring guidelines were followed (Dawson 1996).

Observation methods:

1. Static (a) from first floor viewing point overlooking zone A with New Cross Gate Cutting beyond. Dated and recorded from April 1995 to April 1996, (b) over timed periods from September 1995 to 1 April 1996.
2. Standard Walks in zones B–E: (a) with observations and the time being recorded from April to September 1995, (b) from September 1995 to April 1996 timed.

Timing indicated observer effort for each zone and enabled estimation of this for each zone in 1(a) and 2(a). This essentially corresponds with the LEU Standard Walk (Dawson 1996). The routes walked are shown in Figure 1.

The extent of the study area as a whole was determined by the areas observed from the walked routes; this is equivalent to Kirby's suggested vegetation survey route designs, but with the route defining the study area (Kirby 1985). It was the intention to make an even coverage of timed periods on a monthly, weekly and daily basis, with sufficient observation-time coverage to give a significant 'time sample' per zone to enable comparison. This was largely achieved, but obstruction of view limited the coverage of Zone D.

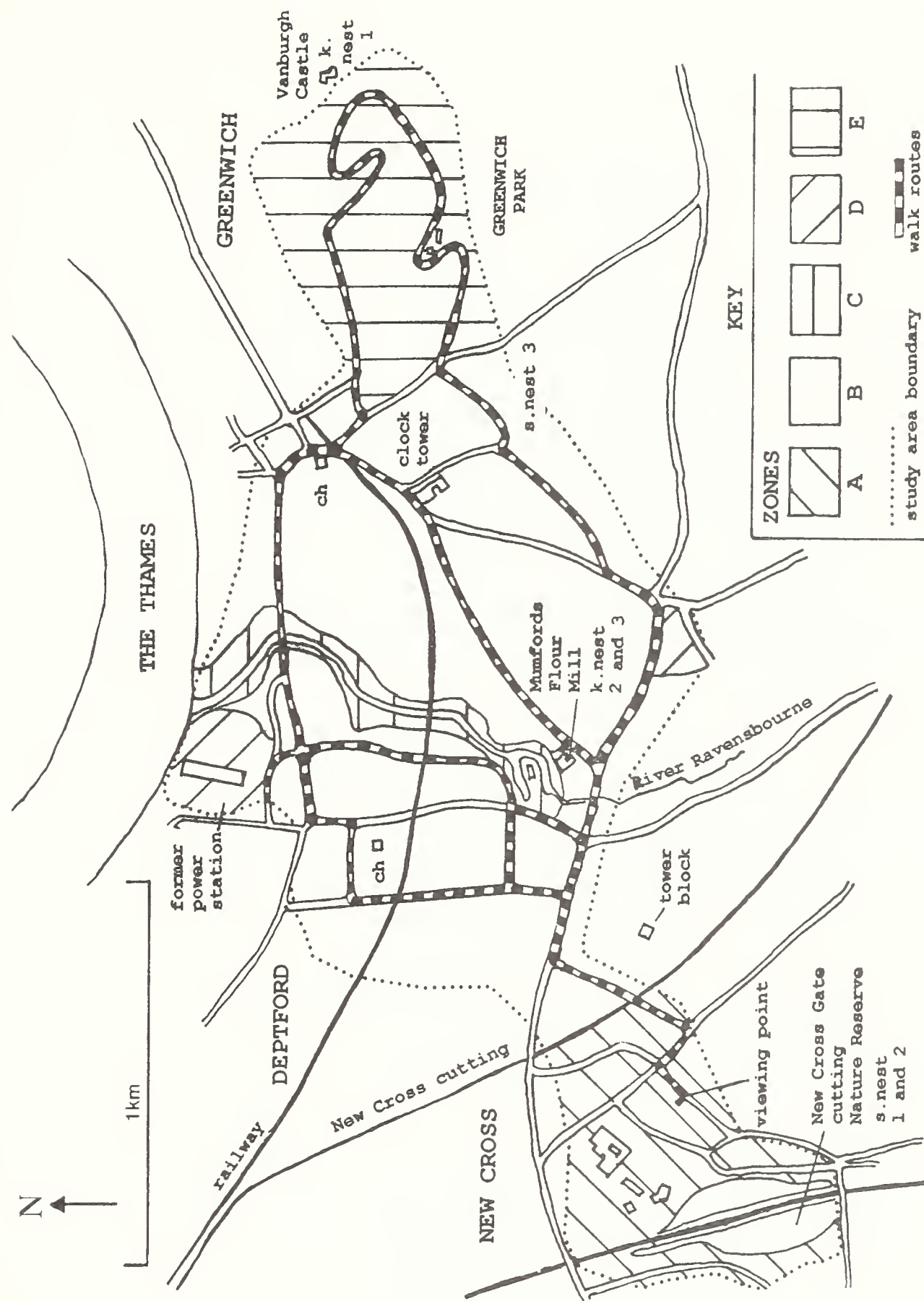


FIGURE 1. The study area.

TABLE 2. The characteristics of habitat types A to E (see page 138).

Zone	A	B	C	D	E
Area	20 hectares	100 hectares	11 hectares	9 hectares	30 hectares
Grid ref. TQ	366767	370770	375770	375778 + 378767	390772
Altitude above sea level	20–30 m	4–20 m	0–4 m	4 m and 10 m	10–45 m
Topography	Plateau with varied heights	Level and sloping N aspect	River course, mud-banks walled in	Level ground	Flat and hilly slope N facing
Geology*	London Clay	Flood plain gravel and Woolwich Beds, clays, sands and loams	Alluvium	Flood plain gravel and Woolwich Beds, clays, sands and loams	Woolwich Beds, clays, sands and loams. Blackheath Beds, sands and pebbles
Flora	Trees, shrubs herbs and grass, mainly lawns on about 50% of area	Few trees, some shrubs, herbs and grass lawns on 20% or less of area	No trees, some scattered shrubs and herbs, chiefly <i>Buddleia</i>	<i>Buddleia</i> , shrubs herbs and grasses	Mature trees, ivy, planted shrubs and herbs, some uncut grass, about 70% of area mown lawn
Buildings	Semi- detached, some flats	Terraced houses, flats, tower- blocks, shops, public, industrial	Industrial, some derelict factories and warehouses	One derelict	Very few

*Geology source, Jones (1981).

Identification

The number of sightings where species identification was inconclusive was < 3 per cent; these observations were left out of the analysis. Difficulty in separating the sexes and ages of birds in the field meant that it was only possible to give a rough guide to their disparity of behaviour.

Sightings of raptors

- At each raptor sighting the following information was recorded:
- (a) Time first seen.
 - (b) Whether kestrel or sparrowhawk (or other spp.), sex and plumage description (where possible).

- (c) Description of activity, e.g., type of flight, perching, interaction with other birds, feeding, etc.
- (d) Where bird was seen and where it went (from written description and/or maps drawn *in situ*).

Signs of raptors

- (a) Pellets — none found.
- (b) Remains of kills, e.g., carcasses, plucked feathers. These were identified for species and age (juvenile or adult). Likely places for pellets and pluckings were inaccessible.

Systematic timed observation

From the end of September 1995 onwards, observation time was measured for each zone by recording:

- (a) The time observation commenced.
- (b) The time observation ceased for each zone.

It was decided that, if for example a bird was seen in zones B and C when the observer was in zone C, it would count as in zone C, but if the observer had been in zone B it would count as in zone B. The sighting is then related to the time the observer has spent in the corresponding zone.

The overall totals for each zone were used as the basis for frequency of sightings calculations, because the gains of using the larger sample were thought to offset the potential bias of uneven distribution of observer effort relating to time of day.

Mapping of sightings

With reference to field notes and rough maps, the movements of each raptor sighted were drawn on maps of the study area for each month (see Figure 2 for an example).

General observations

The following general observations were also recorded:

- (a) Weather.
- (b) Biotic features and events, e.g., pigeon roosts and seasonal leaf fall.
- (c) Relevant anthropogenic factors, e.g., building work. These provide the context in which raptor activity was set through the year.

Results

Frequency of use of habitat types

Both species were seen in all zones, but utilization of zones varied. Table 3 shows numbers of kestrels and sparrowhawks seen and total observation time per zone in minutes per month. This has been standardized to frequency of sightings per hour for both species each month of the year for each zone (Figure 3 provides example).

Line graphs (Figure 3) show frequency of sightings per hour for the whole study area for each raptor. These would be expected to follow a pattern determined by the number of birds present in the area throughout the year, however repeated sightings of perched and displaying kestrels near the nest site have exaggerated some results.

Where the bar chart rises above the line graph of the same species, as for sparrowhawks in January and February in zone C (Figure 3), a selective preference for this zone is indicated.

Zones most frequented

Generally kestrels most frequent zones C (after nest site discovered and zone incorporated in surveys), B and D. September: sightings in all zones, zone D

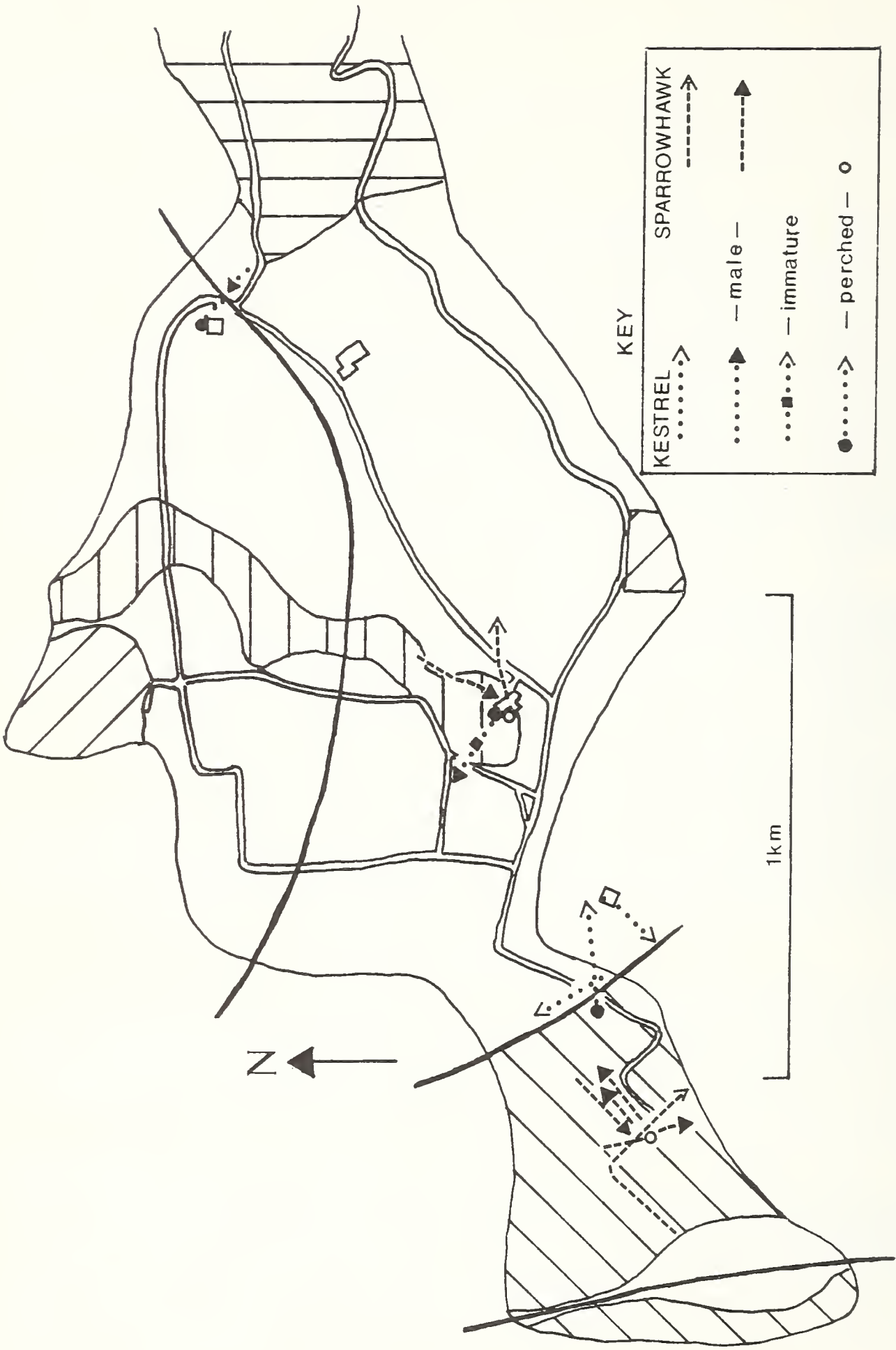


FIGURE 2. Location of kestrel and sparrowhawk sightings for January 1996. Note: those without symbols represent sightings where sex and maturity were not determined.

TABLE 3. Raptor sightings and observation time for each habitat zone per month (see page 141).

Zone	A	B	C	D	E	Total
	2	0	0	0	0	2 s*
Apr.	1,000	350	40	30	200	1,620 mins
	1	1	0	1	0	3 k*
	0	0	0	0	0	0 s
May	1,000	350	30	40	200	1,620 mins
	0	1	0	0	0	1 k
	1	0	0	0	0	1 s
June	1,000	400	50	40	350	1,840 mins
	0	3	0	4	0	7 k
	1	0	0	0	0	1 s
July	1,500	457	410	42	350	2,759 mins
	0	0	26	0	0	26 k
	4	0	0	0	0	4 s
Aug.	1,000	255	120	21	200	1,596 mins
	0	0	5	0	0	5 k
	26	2	2	1	4	35 s
Sept.	2,600	748	323	129	666	4,466 mins
	5	4	9	4	2	24 k
	10	1	0	2	2	15 s
Oct.	2,757	542	175	117	372	3,963 mins
	7	2	3	0	2	14 k
	6	1	0	1	1	9 s
Nov.	2,517	577	138	73	490	3,795 mins
	3	2	0	0	0	5 k
	13	2	0	0	0	15 s
Dec.	2,107	321	34	19	295	2,776 mins
	0	5	2	0	2	9 k
	4	0	2	0	0	6 s
Jan.	1,564	411	191	4	314	2,484 mins
	0	3	2	0	0	5 k
	7	3	4	0	0	14 s
Feb.	2,265	670	379	2	342	3, 658 mins
	0	3	16	0	0	19 k
	4	3	1	0	0	8 s
Mar.	1,649	684	334	14	298	2,979 mins
	5	14	27	0	2	48 k

*s = sparrowhawk, k = kestrel.

highest (from small observation time). October: zone C then E. November: zone B then A. February: zone B then C.

Sparrowhawks: zone A during breeding season (adjacent to nest site). September fledging and dispersal of young: all zones. September, October and November: zone D high (limited observation time). October: zone E high. December: zones A, B. January and February: zone C. March: zone B.

Perching

Kestrel; April 1994 to April 1995: 27 perching sightings included, 10 on buildings, 14 on trees, 3 on ground. April 1995 to April 1996: 155 perching sightings comprised, 114 on buildings, 18 on metal structures (aerials, scaffolding, etc.), 17 on trees, 6 on ground.

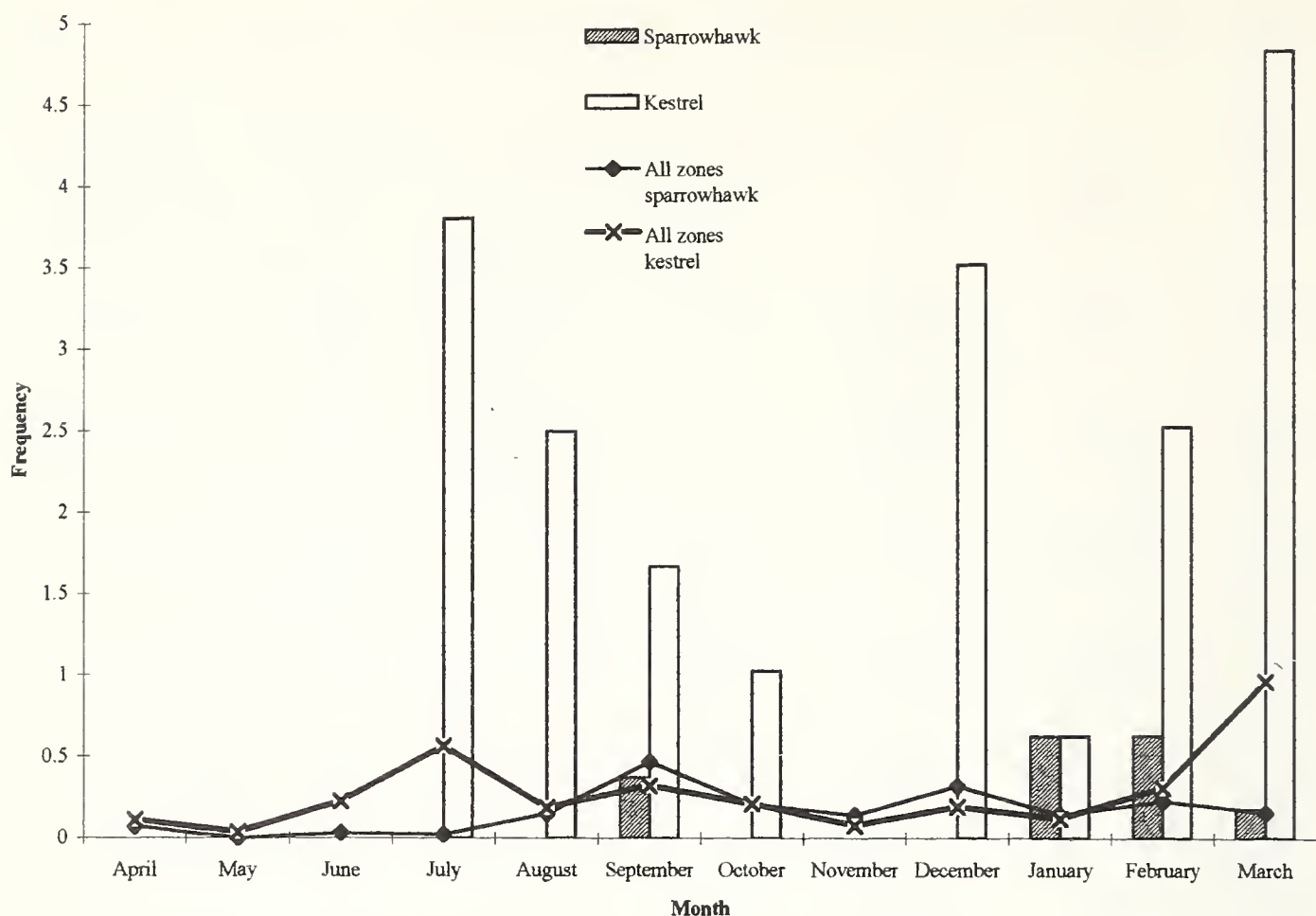


FIGURE 3. Frequency of sightings in zone C (histogram) and frequency of sightings for the whole survey area (line-graphs). Expressed as sightings per hour.

Sparrowhawk; April 1995 to April 1996: 26 perching sightings, 4 on buildings (wooden window frames), 22 on trees.

The results imply kestrels are content to perch on whatever suitable structure is available, natural or man-made. The data reflect the different location of nesting site, in 1994 (by the park) and 1995 (at Mumfords with no trees nearby). The results for sparrowhawks do not so much suggest a lack of behavioural adaptation to the use of man-made perches as a physiological requirement for perches appropriate for delicate 'precision instrument' feet (Brown 1976b). This confirms the importance of trees to sparrowhawks. Sparrowhawks have nevertheless been seen in 1996 perching on a warehouse roof in the nesting area.

Mobbing and flocking

Observations of mobbing and flocking reactions by other bird species to the presence of kestrels and sparrowhawks from April 1995 to March 1996 were:

In 108 kestrel flight sightings the number of occasions mobbed by crows *Corvus corone* were 7, magpie *Pica pica* 3, black-headed gull *Larus ridibundus* 1. Flocking responses, number of occasions: starling 3, feral pigeon 1.

From 131 sparrowhawk flight sightings, occasions mobbed: crows 13, magpie 3, black-headed gull 2. Flocking responses, number of occasions: starling 8, feral pigeon 20.

Shrubb comments: 'it is also remarkable how infrequently common target species such as starling take any notice of kestrels' (Shrubb 1993:55). In this study the reaction of feral pigeons and starlings to sparrowhawks was much greater than the reaction to kestrels; on one occasion the pigeons circled for more than twenty minutes following the arrival of a sparrowhawk. Feral pigeons were regularly seen perched within a metre of a kestrel; this concurs with Shrubb's observation.

Types of flight

Flight observations are summarized in Table 4. The high percentage of kestrel sightings including ‘winnowing’ flight is due to the inclusion of the kestrel nest site in the study. This display flight was rarely seen away from potential nesting sites and repeated observations of the same birds were counted as separate sightings reflecting increased rate of activity as well as presence. Display flights occurred mainly from December to March.

TABLE 4. Types of flight observed per sighting from 131 sparrowhawk and 108 kestrel flight sightings (April 1995–March 1996) expressed as a percentage.

Percentage flights with:	Normal	Fast	Flap-glide	Soar	Hover	Stealthy	Winnowing	Stoop
Kestrel	48.1	2.8	0.9	16.7	7.4		30.5	1.8
Sparrowhawk	32	12.2	19.8	36.6		10.7		8.4 (3e*)

*e = to evade mobbing.
NB. Totals are more than 100 as some sightings included more than one type of flight.

Indications of prey taken — from direct observation

Kestrel; occasions seen with prey: birds 4 (feral pigeons 2, moorhen *Gallinula chloropus* juv. 1, unidentified 1), small mammal 1, earthworm 2. Other evidence from place/seen hunting method, or chasing prey, number of occasions: birds 6, including feral pigeon 4, house martin *Delichon urbica* 1 (but 5 kestrels hunting massing martins), green woodpecker *Picus viridis* juv. 1 (chased), small mammal 5 (hovering over open ground), bat or moth 1 (acrobatic flight at dusk where bats seen), invertebrate (earthworm) 3 (ground hunting).

Sparrowhawk; occasions seen attacking: feral pigeon 2 (January and February), blackbird *Turdus merula* 2, house sparrow 2, starling 1, goldfinch *Carduelis carduelis* juv. 1. Occasions inspecting roosts: feral pigeon 11 (4 January and February).

Signs of raptor kills — Remains of birds and plucked feathers as signs of kills by raptors, Greenwich Park 1995 and 1996.

In 1995, late September to mid November: woodpigeon 10 (including 2 juvenile), feral pigeon 7, mistle thrush *Turdus viscivorus* 1; mammal kills: juv. woodpigeon 1, juv. feral pigeon 1. 1996, late August to early November: woodpigeon *Columba palumbus* 2, mistle thrush 2; mammal kills: feral pigeon 2. Note, mammal ‘kills’ could include raptor kills taken over by mammals.

Raptor kills were distinguished from mammal kills (here most likely foxes) by the fact that raptors pluck their bird prey leaving feathers intact, whereas mammals bite through the bases of the quills (Brown et al. 1992). Goshawks *Accipiter gentilis* and peregrines *Falco peregrinus* are known to feed on pigeons, the latter have been seen in the vicinity of south-east London at the same time of year (September to November) in 1993 and 1994. In 1995 one was seen at Royal Albert Dock on 13 November; peregrines were also seen at Littlebrook and Bankside Power Stations during November and December (Montier 1996). The signs of kills were found in a range of places, from open ground to areas of 75 per cent tree cover, some on raised ground others in dips, and generally appeared to have been plucked at the place of capture. A few showed some attempt at concealment in the manner of sparrowhawks (Newton in Cramp and Simmons 1980) whereas those found in more-open places and on raised ground were more typical of peregrines (Ratcliffe 1993) or kestrels (Village 1990). No firm conclusions can be drawn as to which of these raptors

were responsible. The high numbers of feral pigeons and woodpigeons and their remains observed in zone E in the Autumn of 1995 were not repeated in Autumn 1996.

Discussion

The main habitat needs of raptors can be summarized as the provision of:

1. Nesting, post-fledging, and foraging areas.
2. Habitat to support abundant populations of primary prey species (taken from Reynolds et al. (1992) in the context of goshawk conservation).

Characteristics of this urban environment

Urban environments such as this consist of a patchwork of habitats on a smaller scale than is generally found in rural areas. This provides more 'edge' habitat, and is perhaps akin to traditional agricultural landscapes with a variety of produce. Small fields bordered by hedgerows are not dissimilar to the boundary hedges between domestic gardens. This means that the habitat requirements of each raptor are likely to be found within their normal ranges, but in small localized patches.

Pockets of land left undisturbed by humans, such as land awaiting development and railway cuttings, appear to be important for these species. Habitats of this sort are vulnerable to change, their development being determined by economic and policy changes. The impacts of such changes on kestrels and sparrowhawks can be seen in the results of this study.

Changes affecting habitats

Redevelopment has meant the loss of roughly a third of the local waste ground habitat during the study period. The kestrel nest site at Mumfords flour mill has been affected by restoration work (the windows wire-netted to exclude the pigeons) and surrounding development. Human presence, the noise of construction work and the removal of vegetation may discourage potential prey, perhaps reducing the value of the site for nesting and post fledging. The sparrowhawk nesting site for 1994 and 1995 by New Cross Gate Cutting has been disturbed by continued repair work on the road bridge at Vesta Road after heavy rain caused subsidence in February 1995. Work has begun for the building of houses on the 1996 nest site to the west of Greenwich Park which will exclude sparrowhawks from nesting in this area.

Territorial behaviour

From December to March kestrels, usually males, perched prominently on Mumfords and tall buildings in zone B, suggesting distinct territorial behaviour (Figure 2). For sparrowhawks one function of soaring may have been advertising territory (Newton 1986).

Nesting sites

Kestrels chose tall buildings for nest sites and as feeding and roosting places, whilst sparrowhawks preferred the secrecy of densely wooded areas. A semi-derelict flour mill was the most important feature for kestrels in zone C, both as a nest site in 1995 and 1996, and because its location adjacent to tidal riverside made it an ideal hunting place.

The sparrowhawk nesting site(s) in 1994 and 1995 was located in the New Cross Gate railway cutting, and in 1996 an area near the west of Greenwich Park was used (Figure 1). Both sites are densely wooded with ivy-clad trees and are inaccessible to the public. Perhaps the choice of such undisturbed nesting places reflects the sensitivity of the species to human disturbance. The 1996 nest site was in zone B, but the habitat here is more akin to zone A with larger

domestic gardens and more trees. Had this site been demarcated as zone A this would not have affected the general findings on habitat use.

Post-fledging

The fledglings of both species remained in the vicinity of the nest site for several weeks after leaving the nest whilst still being fed by the adults. Newly fledged kestrels practised hunting by diving on pigeons perched on the derelict mill. The immediate surroundings of the undisturbed nest sites provided the opportunity for young birds to develop flight and hunting skills in relative safety.

Foraging

Heavy rain in September 1995 brought an explosive recovery of vegetation after the severe drought of the summer. The September and October sightings of both species in Greenwich Park (zone E) coincided with the presence of large numbers of woodpigeons and feral pigeons feeding on the abundant seed and fruit produced by drought-stressed trees. There were a number of signs of pigeon kills by raptors over this period (see Signs of raptor kills, above).

The wooded railway cutting dividing zones A and B was used by kestrels for perch-hunting during the winter at dusk (Figure 2), woodmice seen within a hundred metres of this site have peak activity at dawn and dusk in winter (Southern 1964). Kestrels were seen in the Park, foraging on the lawns for earthworms in December, March and August. Earthworms are usually eaten by kestrels from January to March (Shrubb 1993).

Sparrowhawks hunted over waste ground during September, October and November, perhaps attracted by flocks of finches and meadow pipits *Anthus pratensis* seen over this period. Sparrowhawks were more frequent in Greenwich Park in October, possibly attracted by the pigeons. Feral pigeon roosts attracted sparrowhawks even where there were no trees, as at Mumfords (see Perching, above). Hunting was seen at Mumfords in September and particularly during January and February (Figures 2 and 3); this was often towards dusk when pigeons were returning to roost. Gardens in zone A were used for hunting, especially in winter, then largely by male birds perhaps holding nesting territory. The Garden Bird Feeding Survey of 1991–1992 has found a continued increase of sparrowhawks since 1970 in suburban and urban gardens (Glue 1992). Three different individuals were seen in zone A in December 1995 and January 1996 (two male, one female).

Hunting methods

Kestrels hunted from perches during the winter in this study; perch-hunting is more frequent for kestrels in general at this time of year (Shrubb 1993). Perch- and hover-hunting were seen over the waste ground sites (zone D) in April, June and September, suggesting small mammal presence. However, kestrels were rarely seen hover-hunting (Table 4), probably because of the paucity of vole habitat. Techniques such as soaring followed by a stoop, and perch-hunting, are more often used when hunting birds (Village 1990). The indifference shown by feral pigeons to the threat of kestrels enabled the latter to attack the former by running along the ledges of the Mumfords mill, a hunting technique not previously described in the literature.

Sparrowhawk hunting techniques included hunting from concealed tree perches, fast low-flight weaving between 'hedges' of trees and shrubs, and dramatic stoops by soaring birds (perhaps related to courtship behaviour). Sparrowhawks soared frequently (Table 4). Short-stay-perch-hunting was the commonest prey-searching technique, used by all but one of fifty-seven radio-tagged birds in a Scottish study by Marquiss and Newton: the exception hunted largely by stooping from a high soar (Newton 1986). It may be that the urban topography with terrain broken up by buildings favours soaring as a means to

locate prey, and stooping at a steep angle for surprise attack. The use of stoops to initiate fast level hunting flight as in 'prospecting' flight is severely restricted in zones A and B, over two-thirds of the study area, because of obstruction by buildings. The fine weather of the 1995 summer, and the increased thermal convection found in urban areas (Barry and Chorley 1968), may have been conducive to soaring. Stooping was used to evade mobbing by crows on several occasions (Table 4). The purpose of 'voluntary' stoops may have been to attack prey directly, to arrive unseen at a hunting perch, for display, or for hunting and display. The outcome of a stoop was only witnessed once; when one of a pair of soaring sparrowhawks made a spectacular dive; a young goldfinch from a small flock was attacked, missed and then chased.

Analysis of prey

Mumfords housed a starling roost (separate part of building) and the largest feral pigeon roost/nesting site within the study area. It also overlooked the tidal reaches of the Ravensbourne River, frequented by breeding mallard *Anas platyrhynchos* and moorhens. Kestrels take young feral pigeons regularly and have been known to eat adult woodpigeons and the young of waders, ducks and gulls (Riddle 1991). Chicks were regularly taken at a colony of little terns *Sterna albifrons* at Great Yarmouth (Durdin 1992). Mumfords was retained as a perching and feeding place by both sexes (alternately) until November; this suggests the guarding of an important food resource.

In the study area concurrent bird censuses found feral pigeons were particularly abundant, whereas house sparrows (an important prey for both species in urban areas, Village 1990, Newton 1986), song thrushes *Turdus philomelos* and chaffinches *Fringilla coelebs* were scarce. House sparrows are much less common than formerly, possibly reflecting the decline of this species (Gibbons et al. 1993). Feral pigeons weigh 250–350 grams, within the prey weight-range of kestrels and the female sparrowhawk, and theoretically also of the male (if ratio to prey weight is as female, Newton 1986). Feral pigeons are unusual in that they breed throughout the year (Johnston and Janiga 1995). Kestrels and sparrowhawks prefer more easily caught juvenile bird prey (Cramp and Simmons 1980).

Although sparrowhawks prefer small bird prey, 82 per cent of prey was less than 50 grams in Tinbergen's study (Tinbergen 1946, Brown 1976a), this does not necessarily imply a reluctance to kill larger prey. Average prey weight is likely to be related to the prey species which are abundant in an area, as is the case with the peregrine (Cramp and Simmons 1980).

Judgements on the importance of prey species based on number of prey items can be misleading; analysis by weight is more meaningful (Ratcliffe 1993). Woodpigeons were 5 per cent of food items in a Scottish study, but represented 34 per cent of the diet by weight. However, such large prey may be only partly eaten (Newton 1986). Analyses which exclude prey items which form less than 5 per cent by number (e.g., Cramp and Simmons 1980) may be excluding species which are important as a food source. Studies on diet based on pellet (kestrel) or stomach content analysis are likely to underestimate large bird prey, as few bones or recognizable feathers will be consumed, in contrast to small prey often swallowed whole. Studies of diet based on analysis of remains at regular plucking places (sparrowhawk) could exclude larger prey which is eaten at or near the place of capture because it may be too cumbersome to transport to a regular plucking place. Young sparrowhawks which have recently left the nest site may not yet have regular plucking places. With the closely related sharp-shinned hawk *Accipiter striatus*, it was found that juveniles attacked inappropriately large prey more often than did adults (Berger and Mueller 1970, Newton 1986). For this reason it is important when considering sparrowhawk diet to try to include that of juveniles.

It is likely from the lack of observed hover-hunting by kestrels, and of suitable

habitat, that voles were scarce in the study area. In studies where voles were absent or uncommon a greater proportion of bird prey was taken (Ireland — Fairley and McLean 1965, Fairley 1973; Ushant in France — Thiollay 1968, Cramp and Simmons 1980). Urban studies show more bird prey than is typical in rural areas (Paris in summer — Thiollay 1968; but not in winter — Thiollay 1963, Cramp and Simmons 1980; Crichton 1977, Yalden 1980, Pikula et al. 1984, Village 1990), probably because of the scarcity of voles and the abundance of birds (Village 1990). Munich was an exception, with small mammals 97 per cent of prey items by number (Glutz et al. 1971, Cramp and Simmons 1980). House sparrows were the main prey species of the Manchester study (Yalden 1980) and the main bird prey in the summer Paris study (Thiollay 1968). The unusual scarcity of house sparrows and the abundance of feral pigeons suggests that the relative proportion of the former in kestrel prey would be smaller and that of the latter would be larger than in the Manchester study where feral pigeons were 14 per cent of prey by weight (however this is only one study). In Manchester, feral pigeons taken were mostly nestlings (Yalden 1980), and in this study where the location of kestrel nesting, perching and feeding coincided with the largest colony of feral pigeons in the study area (40–80 adults) it is probable that nestlings were also taken by these kestrels. Evidence of prey from this study is small (see Indications of prey, above). When considered with the above information it is likely that birds, and in particular feral pigeons, are important food in terms of weight for the kestrels in this study area, whether as hunted or stolen prey or as carrion. Feral pigeons were noticed as food only of female or immature birds. Invertebrates, probably earthworms in the cases observed, were only seen to be taken or hunted by males. Overall a broad dietary range is indicated.

The urban sparrowhawk diet is thought to include a greater proportion of house sparrows and feral pigeons than is typical for rural birds (Newton 1986). From the abundance of feral pigeons and the scarcity of house sparrows, a favourite prey (Tinbergen 1946, Brown 1976*a*), and the knowledge that sparrowhawk diet is related to availability of prey species (Cramp and Simmons 1980), it is to be expected that feral pigeons would be of some importance in the diet in this study area. The prey evidence, the frequency of use of habitat zones, and direct observations indicated that feral pigeons were hunted by sparrowhawks in south-east London, particularly in winter.

Both raptors are opportunistic hunters known to be drawn to areas of high prey density, such as starling roosts (Newton 1986, Shrubb 1993). This appeared to be the case in this study, notably with sparrowhawks and feral pigeon roosts. More studies of urban kestrel and sparrowhawk diet are needed.

For both species, deviation from typical hunting behaviour and choice of hunting places are linked to the character of the predominant prey species available, which include urban and garden birds.

The urban sparrowhawk

Although the tolerance shown by sparrowhawks of humans and the built environment in this study may suggest recent adaptation, the very name 'sparrowhawk' implies a long association with prey typically found near human settlements. In Newton's 1970–1980s studies of rural Scotland, sparrowhawks rarely entered villages, but in Tinbergen's (1946) study in Holland, where bird prey was abundant in villages, they often did (Newton 1986). Their presence in cities probably reflects the national recovery of the species from the effects of pesticides and the decline of persecution by a generation of city dwellers as alien to gamekeeping as they are unfamiliar with sparrowhawks.

Competition

The presence of breeding sparrowhawks in wooded urban areas may limit the choice of nest sites available to kestrels. There appears however, to be no

shortage of potential sites in tall buildings away from woods which kestrels are able to use.

In this study kestrels fledged in early July in 1995 and in June in 1996, whilst sparrowhawks fledged in September in 1995 and in late July in 1996. Thus, when the more powerful female sparrowhawks start hunting (after fledging) young kestrels, having left the nest some time before, would probably be less vulnerable, making sparrowhawk predation (noted by Newton 1986) unlikely.

The likelihood of a more similar diet for kestrels and sparrowhawks in urban London as compared to their rural counterparts might suggest interspecific competition for food. Any competition for feral pigeons as prey would be lessened by their abundance.

Increases in urban corvid populations, as reported by Gregory and Marchant (1996), may add to the pressures on raptors in terms of energy expended avoiding mobbing (see Mobbing, above, and Table 4), and food piracy. A sparrowhawk was robbed of its starling prey by two magpies.

Conservation

For both species inaccessible/undisturbed areas are important for nesting, post-fledging and foraging. The London Ecology Unit stresses the importance of undisturbed sanctuary areas for wildlife (Baines and Smart 1991). London Wildlife Trust Nature reserves, such as the New Cross Gate Cutting (Figure 1), and Stave Hill (nearby), add permanence to and improve such sites, the former providing suitably undisturbed (visiting is limited) wooded nesting and fledging habitat for sparrowhawks, the latter providing vole habitat for kestrels with its wildflower meadows.

Evaluation of study methods

Many of the advantages and disadvantages of the methods used in the present study are referred to in general terms by Bibby et al. (1992) and Wiens (1989). The method would have been more effective if fewer habitat zones were to be compared and if each zone was a similarly sized discrete block. Regular walks of a fixed period would have made standardization less laborious.

Standard walks could be useful for raptor study where radio-tracking is impractical, such as in urban areas, especially outside the breeding season to avoid the complication of proximity to the nest site (where the nest owners are frequently bound to be). Studies on birds are easier and more often made during the breeding season, therefore methods effective at other times are of particular value.

The division of the study area into habitat zones is of course artificial; combinations of habitats and specific features may be more important. Nesting sites in particular may have been chosen for a combination of reasons including neighbouring habitats (e.g., parkland next to the 1996 sparrowhawk site).

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Book review

More conservation pieces. Humphrey Mackworth-Praed. Jacka Publishing, Little Orchard, Bishampton, Worcestershire WR10 2NL. 1996. 195 pp., paperback. £10 post free from the publisher. ISBN 0 9527937 0 9.

This book is a follow-up to the author's earlier work *Conservation pieces* which I reviewed for *The London Naturalist* 71 in 1992, and it follows a similar theme. There are seventeen 'pieces' in the current book which explore further aspects of the author's varied involvement in nature conservation. Following much energetic work with the Surrey Wildlife Trust and other voluntary organizations, the author was appointed Conservation Officer for The National Trust's Southern Region in 1972, a post which he held for nearly fifteen years. Many of the places mentioned will, therefore, be familiar to LNHS members. There are, for example, discussions about managing fire on Headley Heath, working with volunteers at Frensham Little Pond, and conserving juniper on Hackhurst Down. The book is written in the relaxed and idiosyncratic style which was such an enjoyable feature of the first volume. It conveys much useful practical advice and informed comment distilled from a lifetime's work in the field. There are eighty colour photographs which helpfully point up aspects of the text. The book will appeal to a wide audience, but holds a particular interest to those of us engaged in the complex practicalities of wildlife conservation. This book was finalized posthumously by the author's daughter and, together with the first volume, makes a fitting memorial to a remarkable man who devoted so much of his life to conserving nature in south-east England.

DAVID BEVAN

Spider records for the London Area in 1996

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Abstract

Unusual and new records of spiders for the counties of London and Middlesex in 1996 are noted. There were six new records for London and three for Middlesex. Some comparison of the totals for each of the last five years is made, and the mean number of new species records for the two counties at just under 8.8 per year is noted.

Introduction

The year 1996 was not as spectacular for new county records as 1995 with nine new records, six for London and three for Middlesex. As in previous years, most of the new records resulted from pitfall-trapping, but two of the new records for London resulted from the Society's spider foray to Dulwich Wood on 28 May.

Apart from this foray, and one to Regent's Park in December, this year's records come mainly from general collecting and pitfall-trapping by the author, notably at Buckingham Palace Garden; Hampstead Heath (including West Heath and Hampstead Heath Extension); Highgate Wood; Queen's Wood; The Paddock, Tottenham; and Railway Triangle, Tottenham Hale (this last site is also known as The Willows). The trapping at Queen's Wood continued for the eighth year, but did not produce any new species records in 1996.

Further observations were made and new localities found for a number of locally rare or unusual species including some of those which had been recorded for the first time last year. More than a hundred individuals of *Agyneta decora* were trapped at different places on Hampstead Heath in 1996 — this species had been a new record in 1995 (Milner 1996), not just for the Heath, but for the county of London! A second London record for *Cheiracanthium erraticum* was a female trapped in the meadow above the ladies' swimming pool on Hampstead Heath (site of the first record in 1995), and a third site on Hampstead Heath was found for the uncommon small linyphiid *Porrhomma campbelli*.

Perhaps the two most interesting finds were not actually new county records: the discovery of *Zelotes latreillei* and another unidentified *Zelotes* juvenile at two places on Hampstead Heath. In spite of searches by various authors (Savory and Le Gros 1957, Russell-Smith 1972), this genus had not been recorded from the Heath before, though it must have been present at least historically and is known from a number of adjacent sites such as Highgate Woods and Fortis Green Meadow.

In the list given below new records are indicated as follows: * = new record for Middlesex, ** = new record for London.

DICTYNIDAE

Nigma walckenaeri (*Dictyna viridissima*), a small bright green spider commonly found on ornamental bushes at Regent's Park (and known from a number of other sites in the London Area) was taken in a bark-trap on a large oak at Highgate Wood in August. This is one of the first records from north London.

GNAPHOSIDAE

A single male *Haplodrassus signifer** was trapped at Railway Triangle, Tottenham in May. The only other records in the London Area are from Greenwich Park (London county) and from Richmond Park in Surrey.

Zelotes spp. are velvety black spiders usually associated with ants, especially

meadow ants *Formica rubra*. Undoubtedly the ecological character of Hampstead Heath has changed considerably over the past century or so, but today there are several places where anthills may be found. Along the side of an overgrown hedge north-west of Kite Hill there are several anthills in the grass where they were not disturbed by mowing. A search among the grass roots in this area by the author in the early summer flushed out a single immature *Zelotes* sp. Later in the year a single adult male *Z. latreillei* was taken in a pitfall trap in the 'nettle-bed', an area of dense herbs, predominantly nettles *Urtica dioica* and creeping thistle *Cirsium arvense*. Traps have now been set around one of the anthills near Kite Hill, but no *Zelotes* have yet been taken.

THOMISIDAE

Records for *Ozyptila* spp. were much more frequent than in previous years and two new species for London were recorded. *O. praticola* was trapped at Hampstead Heath, Railway Triangle (Tottenham), and at The Paddock (Tottenham Hale). A single male of the uncommon very small crab-spider *O. sanctuaria*** was trapped in September on Hampstead Heath on the 'Atypus slopes' above Vale of Health. Twenty-seven specimens (including both sexes) of *O. simplex** were trapped in July and August at The Paddock.

SALTICIDAE

A single male *Heliophanus flavipes* was trapped at Railway Triangle, Tottenham in May, this being only the second record for Middlesex, the first being from Hounslow Heath. Both sexes of *Neon reticulatus*** were found in leaf-litter at Dulwich Wood on the Society's spider foray in May.

LYCOSIDAE

Two new sites were found for the attractively marked wolf-spider *Alopecosa cuneata*, previously known in the two counties only from East Heath, Hampstead. This year a single male was trapped on the opposite side of Hampstead Heath on Cohen's Fields near Highgate, and a male was also trapped at Roehampton on the part of Richmond Park which comes into the old county of London. This species is common at a number of other places in Richmond Park (Surrey).

Two males of *Pirata latitans*** were taken in the reed-bed within the bird sanctuary on Hampstead Heath in July.

AGELENIDAE

A very gratifying record in 1996 was the first specific locality for the water-spider *Argyroneta aquatica*. Locket et al. (1974) show this to be recorded for both London and Middlesex, but the precise localities are not known. This year both sexes were taken in pitfall traps in May, in a dense sward of *Glyceria maxima* on marshy ground bordering the River Lea at The Paddock, Tottenham.

THERIDIIDAE

Enoplognatha latimana has been recorded previously from one site in London (at Blackheath) (Milner 1993): in 1996 a single male was trapped in the marshy area on the meadow above the ladies' swimming pool on Hampstead Heath.

A single female *Theonoe minutissima** was found in the school grounds by a pupil at Harrow School in August. The specimen was sent to me by Mike Thain.

ARANEIDAE

The second London record for the small orb-web spider *Araniella opistographa* was a single male trapped in late June near the centre of Hampstead

Heath in the 'nettle bed' (see above). A male *Zilla diodia*** was found in the Malaise trap at Buckingham Palace Garden in May: this may have been brought into the Garden on bedding plants or bushes, as it seems strange that such a conspicuous spider occurred in the area without being noticed before. On the other hand, sweepnetting in the Palace garden in 1997 may produce some further specimens.

LINYPHIIDAE

On the Society's spider foray to Dulwich Wood in May, both sexes of *Walckenaeria corniculans*** were found among leaf-litter, bringing to ten the number of species of this strange genus (most of the males have extraordinarily-shaped cephalic regions) recorded from the London Area. A single male of another uncommon species, *W. cuspidata*, was taken in a trap at The Paddock, Tottenham Hale in May, and in September a single male of the uncommon *Entelecara erythropus* was also taken at the same place. A single male of the uncommon northern species *Metopobactrus prominulus* was trapped at Railway Triangle, Tottenham in July. Both *M. prominulus* and *W. cuspidata* were recorded as Middlesex spiders by Locket et al. (1974), but no specific localities were indicated.

A single female *Moebilia penicillata* was taken in a pitfall-trap at Highgate Wood in July. This tiny dark linyphiid inhabits crevices in the bark of trees, especially oak, but is fairly elusive.

Pocadicnemis pumila (s.s.) is rarely recorded in the London Area since it was separated from *P. juncea* which is common throughout the area. In 1996 two females of *P. pumila* (s.s.) were trapped in July at Highgate Wood.

Nationally *Diplocephalus cristatus* is a common species often found in disturbed urban sites, around buildings, etc., but in London it appears to be not at all common today, though it may have occurred much more frequently in the past. In 1996 a single male was trapped in the wildlife garden at The Natural History Museum in South Kensington, the first record in London since 1991. Also trapped in the wildlife garden at the Museum were a number of individuals of *Prinerigone vagans* (these being the first records in London of this species since 1990). *P. vagans* was described by Savory and Le Gros (1957) as 'the outstanding London spider'.

Several individuals of another synanthropic species, *Ostearius melanopygius*, were trapped in Brompton Cemetery. This attractive pink spider with a black mark around the spinnerets was previously recorded in London only from Camley Street Nature Reserve north of King's Cross Station, and from Phoenix Street Community Garden in Soho. An interesting species, *O. melanopygius* was once thought to originate from New Zealand; the author has personally found specimens in Portugal and in the Azores.

Agyneta decora continues to be common from May to September at various places on Hampstead Heath.

A single female *Meioneta mollis*** was taken in a pitfall-trap in the 'nettle-bed' on Hampstead Heath.

A locally uncommon inhabitant of marshy places, *Tallusia* (*Centromerus*) *experta*, was trapped in 1996 at two places on the main part of Hampstead Heath and also on West Heath; of these only one was a male (trapped in January).

The Nationally Notable *Lepthyphantes insignis*, already known from two places on Hampstead Heath, and from Barnes Common and Hyde Park, was also trapped in 1996 on the west side of Kite Hill, some distance from the other known sites on Hampstead Heath. It has yet to be found on the outlying parts such as Sandy Heath, West Heath, etc., or in the easterly half of the Heath (draining into Highgate Ponds, etc.).

Comparison with previous years

Table 1 shows the summary of records in London and Middlesex for the last few years. The total number of records largely reflects the amount of pitfall-trapping that was done each year as this generates a large number of records. The number of new county records (averaging just over eight per annum for the two counties combined) does not seem to have a very consistent pattern. In 1994, when only one new county record was noted, the author wondered if the fauna was now so well known that further new records would be more difficult to find (Milner 1995), but in fact as indicated then, several new records were already in the pipeline, and this trend has continued. It is expected that 1997 will produce further new species records for the two counties. The Superintendent of Hampstead Heath has indicated that there is likely to be less mowing on the Heath in 1997 and this should certainly contribute to improved grassland habitats across the Heath. In the meadow above the ladies' swimming pool meadow ants may even become re-established: further records of *Zelotes* spp. on the Heath are to be expected.

TABLE 1. A comparison of London and Middlesex spider records for each of the last five years.

Year	Non-linyphiids	Linyphiids	Total spp.	Approx. no. of records	New records	
					M	L
1992	56	61	117	850	6	1
1993	78	67	145	1,050	5	3
1994	79	69	148	1,150	—	1
1995	98	81	179	3,919	4	13
1996	85	78	168	2,917	3	6

Mean (for the two counties combined) of new records: 8.4 per year.

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A review of the butterflies and moths (Lepidoptera) of the London Area for 1995 and 1996

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Contents

Abstract	157
Introduction	157
Correction to the review of 1992–1994.....	157
Larger moths.....	158
Microlepidoptera	161
Butterflies.....	161
Immigration summary.....	162
Vice-county analysis of records of larger moths received.....	165
Acknowledgements.....	174
References	174

Abstract

Lepidoptera records received for the years 1995 and 1996 for the London Natural History Society's recording area are reviewed and selected species are mentioned and discussed. A number of earlier records received recently are also included in the discussion. Two species, the speckled footman *Coscinia cribraria* and the willow-herb hawk-moth *Proserpinus proserpina* are recorded in the area for the first time in history, bringing the total of larger moths to 717 species. A further six species, the false mocha *Cyclophora porata*, last recorded in the London Area in 1967, the plumed prominent *Ptilophora plumigera*, last recorded in 1955, the dotted chestnut *Conistra rubiginea*, last recorded in 1974 (apart from a single example, presumed an escape, reported in 1987), silver hook *Deltote uncula*, last recorded in 1984, the common fan-foot *Pechipogo strigilata*, last recorded in 1971, and the dotted fan-foot *Macrochilo cribrumalis*, last recorded in 1974, have been refound in the London Area. The status categories of nine species listed in *Larger moths of the London Area* (Plant 1993), are formally changed. Distribution maps are presented for the first time for two species now confirmed as resident in the London Area.

Introduction

My last review of the Lepidoptera of the London Area covered the years 1992 to 1994 (Plant 1995) and was the first to appear after publication of *Larger moths of the London Area* (Plant 1993). The present review covers the years 1995 and 1996, taking the opportunity to incorporate also a few records made prior to those years, but only recently received. Throughout this review I use the abbreviation *LMLA* in place of the full title of the book *Larger moths of the London Area* for reasons of brevity. As usual I have employed the artificial categorization of 'larger moths', 'Microlepidoptera' and 'butterflies' in this review. The more important records are drawn together in an initial discussion under each heading and these discussions are followed by details of immigrant species during the two-year period. The vice-county analysis of records received then follows.

Correction to the review of 1992–1994

One such correction has been brought to my attention. Jon King's records of the vestal *Rhodometra sacraria* from Potters Bar should have been cited as 1983 and not 1993. No other errors have been brought to my attention.

Larger moths

Perhaps the best news for the two years under review is the addition of two species to the all-time London Area list. The immigrant speckled footman *Coscinia cribraria* (Linnaeus) was reported as a single example attracted to the Rothamsted Insect Survey trap at Ongar, South Essex on 6 August 1996. It should be placed on page 130 of *LMLA* as number 2053 within the subfamily Arctiinae. The moth belonged to the immigrant subspecies *arenaria* Lempke, which is sparsely recorded from the east coast. The second species is rather more surprising. A single specimen of the willow-herb hawk-moth *Proserpinus proserpina* (Pallas) was discovered resting on a concrete post in the St Katharine Docks at Wapping, Middlesex on 18 July 1995. It is not absolutely certain that this insect arrived here under its own steam, but given the high immigrant moth activity at the time of the record it does seem an extremely plausible explanation. Indeed, the idea of such a moth being imported is possibly more difficult to accept — personally I fancy it to be a primary immigrant. The species is absent from currently published British Lepidoptera check-lists, but should be positioned within the subfamily Macroglossinae of the Sphingidae, after 1985: *Daphnis nerii* and before 1986: *Hyles euphorbiae*.

The total number of larger moths now recorded for the London Area thus rises to 717.

Equally interesting is the rediscovery of six species which were thought, possibly, to have been lost from the London Area and which I had placed in status category 7A in *LMLA* (species formerly resident, now presumed extinct in the London Area). The false mocha *Cyclophora porata* was last recorded in the London Area in 1967, as a singleton in a light-trap at Standon Massey, South Essex. Prior to that record none had been reported since 1951. It is a quite local species of southern English oakwoods and was evidently more plentiful in our area during the last century. Bernard Skinner's capture of a single moth at South Croydon on 9 June 1996 might perhaps herald the start of a comeback for this insect. The plumed prominent *Ptilophora plumigera* was captured at Shoreham, Kent on 11 November 1995 by Ian Ferguson. In *LMLA* I stated that this species was last recorded in the London Area in 1955 (also at Shoreham), though I managed to overlook a record made by Paul Sokoloff from the same locality on 7 November 1973. The late flight period may account for under recording, though these remain the only two sightings of the moth in our area since 1955. The dotted chestnut *Conistra rubiginea* was last reported in London in 1987 as a single example at North Cheam. This was presumed to be an escaped example from breeding stock; the last record prior to this date was in 1974. It is pleasing to report the capture of an example in South Croydon, Surrey in 1996 by Graham Collins. The silver hook *Deltote uncula* was last recorded from Mitcham Common in 1984 and all the evidence suggests that it is no longer present there. Its discovery at Richmond Park in 1995 by Mark Parsons suggests that perhaps this species does still persist at a few selected spots in the London Area; its breeding site at Richmond should be searched for and managed for the moth as a matter of some urgency. The common fan-foot *Pechipogo strigilata* was turned up by Keith Redshaw at Ashted Common, Surrey, on 26 June 1996. It was last recorded from Ashted Common in 1971 and in the London Area as a whole in 1972. Clearly it has persisted undetected (or unreported?) at Ashted Common since that time. The dotted fan-foot *Macrochilo cribrumalis* is a moth which I suggested in *LMLA* may still persist in the Lea and Stort Valleys in the north-east of our recording area. It is therefore particularly pleasing to learn from David Miller that he has found this species in the Lea Valley at the Essex Filter Beds Nature Reserve on the Lea Bridge Road. A specimen was kindly conveyed to me via Edward Milner for confirmation of the identification. Subsequent records suggest that the species is well established at that part of the Lea Valley, whilst an example

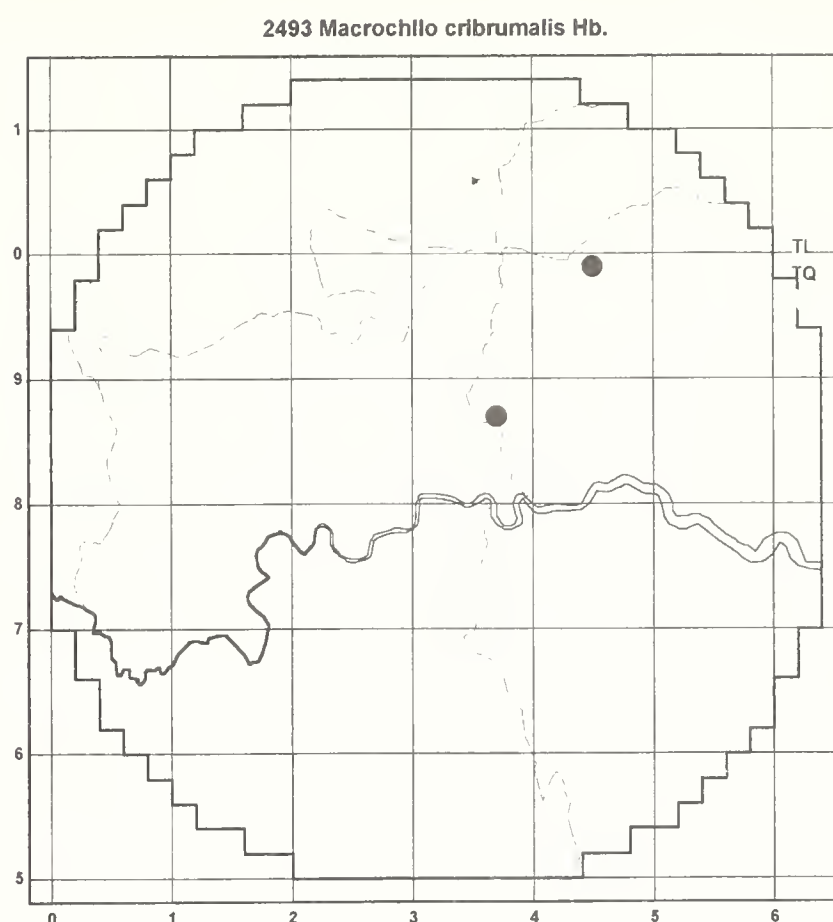


FIGURE 1. The distribution of post-1979 records of the dotted fan-foot *Macrochilo cribrumalis* in the London Area.

was also taken at Theydon Bois in South Essex in 1996 by Mrs J. G. Green — perhaps a wanderer from the Lea Valley. It must surely be present elsewhere in the north-east sector. It now qualifies, as a recently proven resident, for a distribution map (Figure 1).

Taking into account the removal of the rosy wave *Scopula emutaria* to category 10 in my last review, the number of species placed in status category 7A must now, therefore, decrease from 60 to 53. These, together with the removal of pimpinel pug *Eupithecia pimpinellata* from category 7B to category 4 in my last review, and the confirmation of the resident status of the square-spotted clay *Xestia rhomboidea* (discussed below), necessitate the revision of the number of status category 4 species to 110. The number of immigrant species (category 5) must also rise one to 53 to take account of *Coscinia cribraria*. The number of species whose status in our area is uncertain, category 10, now stands at 22.

There were, of course, several other points of interest in the records received for 1995 and 1996. The increase in numbers and range of the waved black *Parascotia fuliginaria* evidently continues with records of good numbers in our Hertfordshire sector. The cypress pug *Eupithecia phoeniceata* turned up in Banstead, Surrey on 31 July 1995 and could perhaps have been taken for an immigrant if it were not for the capture of three more at the same place in August 1996. Of course, there was much immigrant activity around the latter date, so the truth of the matter is currently uncertain, though this is a moth quite likely to spread into the London Area and it should certainly be watched out for. Goat moths *Cossus cossus* were also reported during the reviewed period, in both Surrey and Middlesex and this species may be staging a localized recovery.

The red-green carpet *Chloroclysta siterata* was included in *LMLA* on the strength of only nine London Area records, all of which were listed. Only two of these, from Dawcombe and Banstead Downs, both Surrey, in November 1990, were made in the post-1979 'current' period and prior to these the most recent was the one mentioned for West Kent in the *Woolwich Surveys* of 1909.

I was therefore somewhat taken aback when I found a male specimen amongst material taken at Harrow on 29 October 1996 by John Hollingdale — the first Middlesex record since 1898 — not bad for his first year of recording! Since then, records have also been received for 1996 from Banstead in Surrey and Halstead in West Kent, for 1995 from Richmond Park and, belatedly, for 1994 from Croydon. This moth is evidently extending its British range eastwards, much in the same manner as did the black rustic *Aporophylla nigra* and the grey shoulder-knot *Lithophane ornitopus* in recent years, and so its presence in the London Area was perhaps to be expected. Though our records are concentrated in the south and west of our area, it is worth noting that I recorded the species in my garden trap at Bishop's Stortford, ten kilometres outside our area in the north-east, in October 1996 for the first time; evidently the red-green carpet is likely to be found elsewhere in the London Area and I would particularly welcome all records, with dates and numbers, to enable its colonization to be properly documented.

Another moth which is evidently making some sort of a comeback in the London Area is the shaded broad-bar *Scotopteryx chenopodiata*. Some ten or fifteen years ago this was a very common moth of wasteland and other places in London, and could be disturbed from long grass and herbage in some numbers. More recently, however, it seems to have become less numerous and has been reported less often. In 1996 we saw an increase of records with several people who are relative newcomers to moth-trapping (those starting to operate traps within about the last ten years), reporting shaded broad-bars in their gardens for the first time. This is perhaps another species we need to keep an eye on. Its London Area larval foodplants are completely unknown. To a lesser extent the brown silver-line *Petrophora chlorosata* is another species that is now reported more frequently than a few years ago. The larvae of this moth feed on bracken *Pteridium aquilinum*. One final species that may be increasing in our area is the chocolate-tip *Clostera curtula*, though it is unclear if the scatter of new records in previously blank northern areas of the distribution map reflects genuine range expansion, increased detection as a result of a population rise, or is a reflection of earlier under recording.

Three other species of larger moth also deserve special mention here before progressing to the traditional county-by-county summary. The pimpinel pug *Eupithecia pimpinellata* was flagged as a category 7B species (formerly widespread resident, but with no recent records; possibly overlooked) in *LMLA*. I hesitated to consider it possibly extinct (category 7A) as I felt that diligent searching may yet uncover sites for the moth. I was happy to record in my review of 1992–1994 that John Chainey and Jenny Spence had indeed discovered the insect on the very edge of our recording area in Hertfordshire and I accordingly changed its categorization from 7B to 4 (extremely rare resident). It is therefore especially pleasing to learn from Graham Collins that the moth has now been found at three Surrey localities in the London Area. This moth should surely now be looked for all over the London Area as it is likely to be present in several other sites. The square-spotted clay *Xestia rhomboidea* was not mapped in *LMLA* and I placed it in status category 10 (uncertain). It is now necessary to change the status of this species from 10 to 4 (extremely scarce resident) on the strength of records from Buckland on 19 August 1992 and Headley Warren, where five came to light on 4 August 1994 and about ten were observed on burdock *Arctium* flowers on 29 July 1995. In my last review, of 1992–1994, I listed this species in the Appendix on page 156. Taking all the records together, we now have the moth in four separate tetrads, all in the far south-west of our recording area. It is now appropriate to publish a distribution map for this species and this is presented as Figure 2.

The discovery of a goat moth *Cossus cossus* by Mark Parsons in Richmond Park during 1995 must give some hope for the continued survival of this endangered species in the London Area, though under recording seems a rather

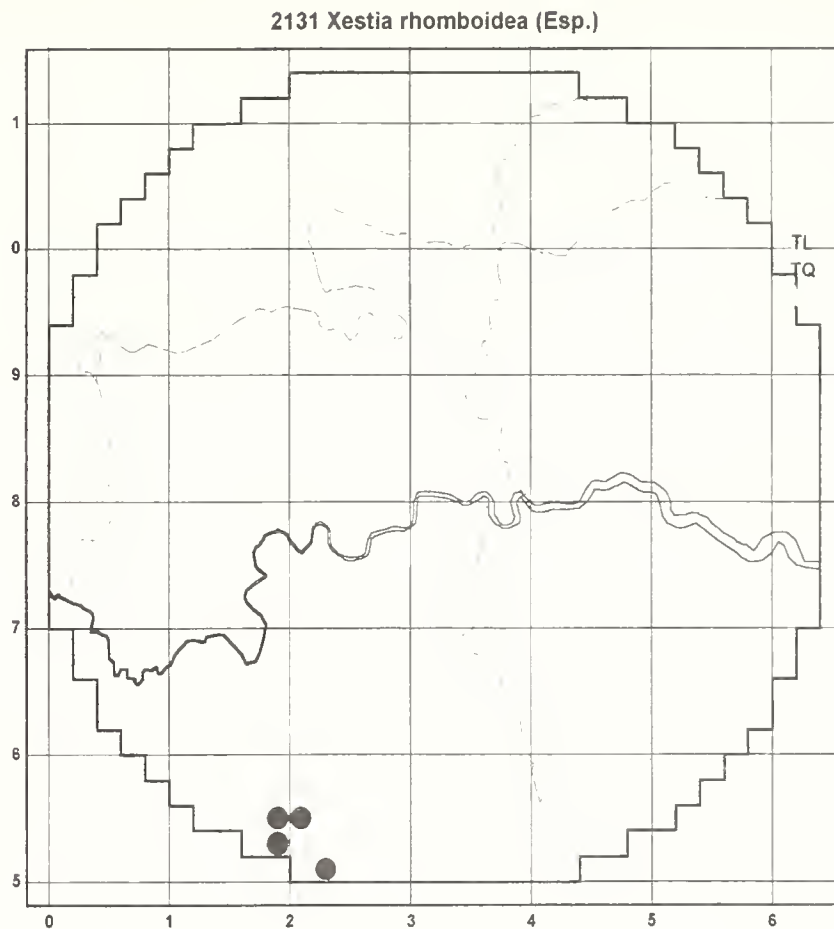


FIGURE 2. The distribution of post-1979 records of the square-spotted clay *Xestia rhomboidea* in the London Area.

unlikely explanation for the absence of records. Under recording may, on the other hand, account for the apparent scarcity of species such as the mottled grey *Colostygia multistrigaria*, also reported from Richmond Park and from Headley Warren, and the six-belted clearwing *Bembecia scopigera*, reported from one location in Surrey and from three in South Essex during the two-year period.

To complete this introduction to the review of larger moths, five species were recorded from our South Essex portion for the first time. These were the dwarf pug *Eupithecia tantillaria*, the clouded magpie *Abraxas sylvata*, the peacock moth *Semiothisa notata*, the bordered beauty *Epione repandata* and the speckled footman, referred to above. Two new species were added to the Hertfordshire part of the London Area in the form of the privet hawk-moth *Sphinx ligustri* and the pretty chalk carpet *Melanthia procellata*. One species, in the form of the green arches *Anaplectoides prasina*, was completely new to Middlesex. No new species were added to the London list from our portions of West Kent, Surrey or Buckinghamshire.

Microlepidoptera

Though a good supply of records of micros continues to flow in my direction from a select few people, these have largely been, with a few exceptions, of relatively widespread species. Work is well under way on the production of a complete list to the Microlepidoptera of the Middlesex vice-county, but until this list is a little nearer readiness for publication interpretation of records is still a matter, largely, of guesswork. Contributors will, I hope, forgive me for not listing their records here now.

Butterflies

The new recording project initiated by the organization Butterfly Conservation, which aims to produce tetrad maps of all British butterfly distributions for the

year 2000, is now well established, and many people who only record butterflies are sending their records direct to that project. This is not likely to cause any particular problems as records are regularly interchanged between Butterfly Conservation and the LNHS. Too few records have as yet reached me for the 1995–1996 period to permit a full review, but a number of interesting points have emerged from the data that have been supplied.

First, there has evidently been a marked increase in both numbers and range of the brown argus *Aricia agestis*. Records have been sent from a large number of localities spread all across the outer zones of the London Area, though as yet we have no records from the central region. All county areas are affected, however. The white-letter hairstreak *Strymonidia w-album* is also on the increase and has evidently fully recovered from its drastic reduction in numbers during the Dutch elm disease epidemic of the 1970s. Reports of this species have come from Surrey, Kent, South Essex, Hertfordshire and Middlesex. One enterprising butterfly landed on the grass during a Southern League athletics match at Bannister Stadium, Hatch End on 17 August 1996 where it was probably seen by thousands but only recognized for its true worth by Alan Gibson; another intrepid explorer was seen in urbanized West Hampstead in 1996 by David Rear.

White admirals *Ladoga camilla* were seen in Hoddesdon Park Woods, Hertfordshire with ten on 21 July 1996, including one example of ab. *nigrina* Weymer. These attractive butterflies were also observed at *Buddleia* in a garden at Wimbledon on 6 August 1996 by Ron Kettle, who also saw a silver-washed fritillary *Argynnis paphia* at Bookham Common four days later.

At the Royal Masonic Hospital in Hammersmith, Neil Anderson recorded the first ever gatekeeper *Pyronia tithonus* in this area, a male, on 8 July 1996, as well as a ringlet *Aphantopus hyperantus* on 22 July of the same year. These are two very interesting records for the central area of London.

Migrant butterflies probably accounted for more records than did all the rest of the Lepidoptera put together during 1996, which can truly be called 'the year of the painted lady'. Vast numbers of *Cynthia cardui* reached our shores from overseas and were seen just about everywhere. Those records which I have received and which contained adequate data are tabulated below, as are records of the clouded yellow *Colias croceus*, which also visited us in numbers. A long-tailed blue *Lampides boeticus* was seen at Gillespie Park, Middlesex on 19 July 1996 by David Bevan, and a Camberwell beauty *Nymphalis antiopa* was noted at Hoddesdon, Hertfordshire on 26 March 1996 by Tom Gladwin.

Some visitors, on the other hand, arrive other than under their own steam. Ray Softly found larvae in some 'Kenyan beans' purchased from a shop in Hampstead on 15 August 1995. These duly pupated on 26 August after being fed on packeted frozen beans (presumably thawed?) and on 8 September yielded adults of the African lycaenid *Deudoryx anatalus* Hopffer.

Immigration summary

LMLA listed all records of immigrant Lepidoptera in the London Area which I had received for all time up to the end of 1991, whilst in my last review (Plant 1995) I listed a number of additions. The following summarizes additional records received, presented taxonomically then, so far as is possible, chronologically.

YPONOMEUTIDAE

Diamond-backed moth *Plutella xylostella*: Banstead, Surrey, a total of 222 between 7 June and 22 July 1996 with the vast majority in early June (S. W. Gale); Hampstead, Middlesex, recorded in 1996 on 23 April, from 7 June to 11 August and then on 2 September (R. A. Softly).

PYRALIDAE

Udea ferrugalis: Banstead, Surrey, a total of 63 between 10 June and 30 October 1996 though there was none in July and the peak arrival was in August (S. W. Gale); Hampstead, Middlesex, from 14 to 29 August and then on 5 September 1996 (R. A. Softly).

Dioryctria abietella: Banstead, Surrey, a large example, probably an immigrant on 8 August 1996 (S. W. Gale); West Hampstead, Middlesex undated, 1996 at Heath light-trap in a second-floor window (D. Rear).

Rush veneer *Nomophila noctuella*: Essex Filter Beds, South Essex, from 8 June to 22 September 1996 a total of 109 seen (D. Miller); Hampstead, Middlesex, none in 1995, but a total of 147 in 1996, on 9 June (25 examples), then from 20 July to 23 October, with a peak of 12 on 29 July (R. A. Softly).

PIERIDAE

Clouded yellow *Colias croceus*: Coppets Wood, Middlesex, 9 June 1996 and 26 August 1996 (T. Clancy); Chalfont Park, Bucks., 2 on 4 June 1996 (D. Rear); Southlands NR, Bucks., 3 on 7 June 1996 (D. Rear); Banstead, Surrey, 2 on 9 June 1996 (S. W. Gale); Thorney Country Park, Bucks., 14 June 1996 (D. Rear); Old Slade NR, Bucks., 4 on 18 June 1996 (D. Rear); Woodlands Park, Bucks., 4 on 14 July 1996 (D. Rear); Langley Park, Bucks., 1 on 23 July 1996 (D. Rear); King George V Reservoir, Middlesex, 2 on 29 July 1996 (A. Middleton); Ponders End Lake, Middlesex, with *C. cardui*, *V. atalanta* and *A. gamma* on 29 July 1996 (A. Middleton); Marish Lane, Bucks., 1 on 8 August 1996 (D. Rear); Turnford, Herts., a female on 2 August 1996 which laid fertile eggs (P. Jeffrey); Wimbledon, Surrey, 1 on each of 11 August and 21 August 1996 (R. Kettle); Three Mills Island, Essex, 17 August 1996 (D. Miller); Wraysbury Reservoir, Bucks., 1 on 17 August 1996 (C. Lamsdell); Enfield, Middlesex, a male on 17 August 1996 (R. M. Callf); Essex Filter Beds, 1 each on 24, 25 and 26 August 1996 (D. Miller); Coppets Wood, Middlesex, 26 August 1996 (T. Clancy); King George V Reservoir, Middlesex, 30 August 1996 (T. Clancy); Thorney Country Park, Bucks., 1 on 31 August 1996 (C. Lamsdell); Barkingside, Essex, 13 September 1996 (T. Clancy).

LYCAENIDAE

Long-tailed blue *Lampides boeticus* Gillespie Park, Middlesex, 19 July 1996 (D. Bevan).

NYMPHALIDAE

Red admiral *Vanessa atalanta*: Hampstead, Middlesex, noted in 1996 on 3 April and then from 31 May to 10 October with a total of 161 in all (R. A. Softly); Woodlands Park, Middlesex, 4 on 4 June 1996 (D. Rear); Royal Masonic Hospital, Hammersmith, Middlesex, from 4 June to 1 October 1996 in good numbers (N. Anderson); Wimbledon, Surrey, early June to early September 1996 — a few (R. Kettle); Southlands Manor, Bucks., 1 on 7 June 1996 (D. Rear); Potters Bar, Middlesex, 13 June 1996 (J. King); Kensington Gardens, Middlesex, 1 on 18 June 1996 (R. Kettle); Trent Park, Middlesex, 6 June 1996 and 15 July 1996 (R. M. Callf); Enfield, Middlesex, on 6 June 1996 and 15 July 1996 (R. M. Callf); Edmonton, Middlesex, on 12 June 1996 and 2 October 1996 (R. M. Callf); Ponders End Lake, Middlesex, with *C. croceus*, *C. cardui* and *A. gamma* on 29 July 1996 (A. Middleton); Barkingside, Essex, August 1996 (K. Black); Queenswood, Herts., 3 August 1996 (J. King); South Mimms, Middlesex, 5 August 1996 (J. King); Denham, Bucks., 8 on 8 August 1996 (D. Rear); Thorney Country Park, Bucks., 1 on 4 October 1996 (D. Rear); Northmoor Hill Wood, Bucks., 1 on 26 October 1996 (D. Rear); Woodlands Park, Middlesex, 1 on 17 October 1996 (D. Rear); Royal Vet. College, Middlesex, 17 October 1996 (J. King).

Painted lady *Cynthia cardui*: Enfield, Middlesex, 31 May to 8 June 1996 (R. M. Callf); Trent Park, Middlesex, 5 June and 8 June 1996 (R. M. Callf); Edmonton, Middlesex, 10 June 1996, 27 July 1996 and 15 August 1996 (R. M. Callf); West Hampstead, Middlesex, 17 July 1994 (D. Rear); Perry Oaks SF, Middlesex, 2 on 8 June 1996 and 28 on 25 July 1996 (C. Lamsdell); Essex Filter Beds, 7 June 1996 (D. Miller); West Hampstead, Middlesex, 7 June 1996 (D. Rear); Wimbledon, Surrey, 1 on 18 June 1996, a few from 10 June to 12 August 1996 (R. Kettle); Royal Masonic Hospital, Hammersmith, Middlesex, from 4 June to 25 June, then on 17 July and then from 2 August to 4 September 1996 (N. Anderson); Banstead, Surrey, almost daily records from 7 June to early October 1996, with double figures most days and a peak of 50 on 9 June — increases coincided with immigrant moth arrivals (S. W. Gale); Ponders End

Lake, Middlesex, with *C. croceus*, *V. atalanta* and *A. gamma* on 29 July 1996 (A. Middleton); Lowe Green 25 July 1996 (J. King); Barnet 27 July 1996 (J. King); Hadley Wood, Middlesex, 27 July 1996 (J. King); Letty Green 28 July 1996 (J. King); Queenswood, Herts., 3 August 1996 (J. King); Hertingfordbury 4 August 1996 (J. King); Holwell Court 4 August 1996 (J. King); Wildhill, Herts., 11 August 1996 (J. King); Bayford 18 August 1996 (J. King); Swallow Grove 26 August 1996 (J. King).

Camberwell beauty *Nymphalis antiopa*: Hoddesdon, Hertfordshire, one seen on 26 March 1996 (T. Gladwin per J. Murray).

GEOMETRIDAE

Vestal *Rhodometra sacraria*: Buckland, Surrey, 19 May 1992; 27 September 1992; 30 September 1992; 21 August 1994 (C. Hart); Richmond Park, Surrey, 6 August 1994 (D. Coleman); Nutfield, Surrey, 7 and 13 August 1994 (P. Cordell); Wimbledon, Surrey, 1 on 14 October 1995 (J. V. Dacie).

Gem *Orthonama obstipata*: Buckland, Surrey, 8 November 1994 (C. Hart); Harlow, North Essex, 1 male on 7 June 1996 (W. G. Last); Banstead, Surrey, 1 on 7 June 1996 (S. W. Gale); South Croydon, Surrey, 26 July 1996 (G. A. Collins).

SPHINGIDAE

Willow-herb hawk-moth *Proserpinus proserpina*: St Katharine's Dock, Wapping, Middlesex, one found at rest on a concrete post, 18 July 1995 (T. Moore per B. Skinner).

Humming-bird hawk-moth *Macroglossum stellatarum*: Potters Bar, Middlesex, 20 August 1996 (J. King); Banstead, Surrey, singles on 26 July and 19 and 28 August 1996, all at honeysuckle (S. W. Gale).

Bedstraw hawk-moth *Hyles gallii*: Theydon Bois, Essex, 1 on 28 July 1990 (J. G. Green).

ARCTIIDAE

Speckled footman *Coscinia cribraria*: Ongar, South Essex, one, subspecies *arenaria* Lempke in the Rothamsted Insect Survey light-trap on 6 August 1996 (per B. Goodey).

NOLIDAE

Kent black arches *Meganola albula*: Croydon, Surrey, 22 July 1993 (G. A. Collins) — resident on the North Downs, but this record is thought to relate to a primary immigrant.

NOCTUIDAE

Dark sword-grass *Agrotis ipsilon*: Hampstead, Middlesex, reported in 1996 on 7, 11 and 24 June, 29 September and 9 October (R. A. Softly); Theydon Bois, South Essex, 4 on 4 August 1990 (Mrs J. G. Green); Banstead, Surrey, 15 November 1992 (S. Gale); Buckland, Surrey, 27 June 1994 and 10 November 1994 (C. Hart); Ashted Common, Surrey, 9 July 1994 (G. A. Collins); Headley Warren, Surrey, 4 August 1994 and 29 July 1995 (G. A. Collins); South Croydon, Surrey, 15 July 1994, 13 July 1995 and 4 September 1995 (G. A. Collins); Richmond Park, Surrey, 22 July 1995 (G. A. Collins); Limpsfield Chart, Surrey, 4 August 1995 (G. A. Collins); Harlow, North Essex, one on each of 14 and 16 June 1996 (W. G. Last); Banstead, Surrey, five examples, one each on 8 June, 9 August, 11 August, 11 September and 6 October 1996 (S. W. Gale); Easneye, Herts., 1 on 31 August 1996 (M. Pledger); South Croydon, Surrey, one each on 18 August and 26 October 1996 (G. A. Collins); Barnehurst, Kent, recorded from 3 September to 3 November 1996 (T. Steele).

Pearly underwing *Peridroma saucia*: Hampstead, Middlesex, a total of 16 during 1996 from 19 June to 3 July, and then again from 30 September to 1 November (R. A. Softly); South Croydon, Surrey, 7 August 1992 (G. A. Collins); Banstead, Surrey, 10 August 1992 and 15 September 1992 (S. Gale); Buckland, Surrey, 12 November 1994 (C. Hart); Essex Filter Beds, South Essex, 1 on 8 June 1996 (D. Miller); Banstead, Surrey, 11 singles on 17 June, 21, 23, 25, 26 and 30 September and 7, 8 and 24 October 1996 (S. W. Gale); Barnehurst, Kent, 17 June 1996 (T. Steele).

Great brocade *Eurois occulta*: Parndon Wood NR, Harlow, North Essex, one at mv light on 7 September 1995. This moth, a female, excreted a drop of bright green meconium on being placed in a card pill-box, suggesting that it had recently emerged. For the time being, however, it is placed here amongst the list of immigrant moths to avoid the record being overlooked at a later date (C. W. Plant); South Croydon, Surrey, 22 August 1995 (G. A. Collins); Easneye, Herts., 22 August 1995 and 15 August 1996 — one on each date (M. Pledger); Theydon Bois, South Essex, 30 August 1996

- (J. Green); South Croydon, Surrey, 2 September 1996 (G. A. Collins); Hampstead, Middlesex, one on 2 September 1996 (R. A. Softly).
- The cosmopolitan** *Mythimna loreyi*: Buckland, Surrey, 6 November 1994 (C. Hart).
- The delicate** *Mythimna vitellina*: Theydon Bois, South Essex, 1 on 28 June 1993 (Mrs J. G. Green).
- Golden-rod brindle** *Lithomoia solidaginis*: Broxbourne Woods, Hertfordshire, one on 7 September 1996 (M. Pledger).
- Small mottled willow** *Spodoptera exigua*: Essex Filter Beds NR, South Essex, one on 4 August 1996 (D. Miller); Nutfield, Surrey, 5 August 1994 and 26 August 1994 (P. Cordell); Hampstead, Middlesex, one on 18 August 1996 (R. A. Softly); Buckland, Surrey, 12 November 1994 (C. Hart); Banstead, Surrey, 10 October 1995 (S. Gale); Chingford, South Essex, a total of 9 in 1996 as follows: 3 July — 1, 6 July — 2, 8 July — 2, 9 July — 2, 18 July — 1 and 26 July — 1 (B. Pateman).
- Scarce bordered straw** *Heliothis armigera*: Enfield, Middlesex, 1 on 2 August 1992 (A. Hughes); Theydon Bois, South Essex, one on 14 October 1996 (J. Green); Banstead, Surrey, 15 October 1995 (S. Gale); South Croydon, Surrey, 24 October 1996 (G. A. Collins).
- Bordered straw** *Heliothis peltigera*: Theydon Bois, South Essex, one on 10 June 1996 (J. Green); Buckland, Surrey, 2 July 1994, 7 August 1994 and 30 July 1995 (C. Hart); Nutfield, Surrey, 22 August 1994 and 4 September 1994 (P. Cordell); Essex Filter Beds, South Essex, 1 on 8 June 1996 (D. Miller); Harlow, North Essex, one on 8 June 1996, two on 9 June 1996 and one on each of 15, 17, 20 and 22 June 1996 (W. G. Last); Potters Bar, Middlesex, 12 June 1996 (J. King); South Croydon, Surrey, one each on 9 June, 17 June and 2 September 1996 (G. A. Collins); Barnehurst, Kent, 18 August 1996 (T. Steele).
- Ni moth** *Trichoplusia ni*: Addington, Surrey, a male on 21 August 1996 (B. Skinner).
- Dewick's plusia** *Macdunnoughia confusa*: Buckland, Surrey, 20 August 1992 (C. Hart).
- Silver Y** *Autographa gamma*: Hampstead, Middlesex, a total of 595 in 1996, from 25 April to 7 November with a peak catch of 164 on 6 August (R. A. Softly); Theydon Bois, Essex, a total of 782 in the season from the first on 12 May 1996 (J. G. Green); Harlow, North Essex, from 6 June to 7 September 1996 — a total of 282 (W. G. Last); Bromley, West Kent, from 7 June to 23 August 1996 — many (I. Pryer); many localities on the Herts./Middx. border region, from 8 June to 25 August 1996 (J. King); Chingford, Essex, 220 from 4–31 July 1996 (data only available for July) with a marked increase in nightly numbers from 22 July to the end of the month (B. Pateman).

Vice-county analysis of records of larger moths received

The following is a county-by-county review of the more interesting or important records so far received and affecting the London Area. A good many people have submitted records which are not discussed here; these contributors should be aware that their offerings are nonetheless valuable and have added a very large number of dots to the distribution maps in *LMLA*. All contributors of data are acknowledged at the end of this review.

V.C. 16, West Kent

The rediscovery of the plumed prominent *Ptilophora plumigera* at Shoreham stands out as the most important contribution to our knowledge of the larger moths in our part of West Kent. The moth was discovered by Ian Ferguson on 11 November 1995 and is evidently an overlooked resident in this area; it had been taken in the adjacent tetrad up to 1955 and was also noted there on 7 November 1973 by Paul Sokoloff — a record which I was unaware of when preparing the text for *LMLA*.

Peter Jupp has sent me an extensive list, as usual, of captures in his garden at West Wickham. Amongst those for 1995, nineteen stand out as new for the site and also for his tetrad of the map. These include the December moth *Poecilocampa populi* on 25 October which is rather earlier than this moth is usually recorded in our area by about three weeks. Earlier, in the spring, the yellow horned *Achlya flavicornis* put in an appearance as singletons on each of 1 and 3 April. The more or less unmarked ab. *obscura* Lempke of

the pale tussock *Calliteara pudibunda* was in evidence from 6 May to 2 June with six examples in all coming to light. Other new species were the flame carpet *Xanthorhoe designata*, shaded broad-bar *Scotopteryx chenopodiata*, blue-bordered carpet *Cosmorhoe ocellata*, grey pine carpet *Thera obeliscata*, white-spotted pug *Eupithecia tripunctaria*, brown silver-line *Petrophora chlorosata*, feathered thorn *Colotois pennaria*, poplar kitten *Furcula bifida*, scarce prominent *Odontesia carmelita*, yellow tail *Euproctis similis*, nutmeg *Discestra trifolii*, shark *Cucullia umbratica*, Blair's shoulder-knot *Lithophane leautieri*, satellite *Eupsilia transversa*, red-line quaker *Agrochola lota* and lunar underwing *Omphaloscelis lunosa*.

John East's garden at Halstead produced no less than twenty new species during 1996 as well as repeat records for category 3 and 4 species listed in LMLA. The newcomers were the gold swift *Hepialus hecta*, only the eighth recent record for our part of Kent, leopard moth *Zeuzera pyrina*, a male oak eggar *Lasiocampa quercus*, the ninth in this region, maiden's blush *Cyclophora punctaria*, satin wave *Idaea subsericeata*, dark-barred twin-spot carpet *Xanthorhoe ferrugata*, beautiful carpet *Mesoleuca albicillata*, a red-green carpet *Chloroclysta siterata*, northern winter moth *Operophtera fagata*, netted pug *Eupithecia venosata*, oak-tree pug *Eupithecia dodoneata* — only the second recent record in the Kent part of the London Area, shaded pug *Eupithecia subumbrata*, sloe pug *Chloroclystis chloerata*, small engrailed *Ectropis crepuscularia* — also a new ten-kilometre square-record, an alder kitten *Furcula bicuspis* — updating an old tetrad record, the second recent record for our part of Kent and only the eighth recent record for the entire LNHS area (all in Kent and Surrey), autumnal rustic *Paradiarsia glareosa* — only the second recent Kent record, light brocade *Lacanobia w-latinum*, orange sallow *Xanthia citrigo*, alder moth *Acronicta alni* and the small dotted buff *Photedes minima*.

Tony Steele started trapping in his garden at Barnehurst in 1996 and contributed almost two hundred tetrad records for a poorly recorded area. Not surprisingly, most of these were of common species, but he did have several that made it all worth while. Two pugs, the ash pug *Eupithecia fraxinata* and the ochreous pug *E. indigata* warrant particular mention. Both are restricted in distribution and both records, coincidentally, provide only the seventh in recent years for each species in our area. This must serve to emphasize the under-recorded nature of the pugs generally in the London Area. The mullein wave *Scopula marginepunctata* and the least carpet *Idaea vulpinaria* were both noted, adding extra map dots to consolidate the known distribution of these species in our area. The latter moth was also noted by Tony at Bexleyheath Bus Garage — a surprising location. The satin wave *Idaea subsericeata* and the phoenix *Eulithis prunata* represent two further species that are widespread but uncommon in the London Area, whilst the minor shoulder-knot *Brachylomia viminalis* and the rufous minor *Oligia versicolor* are both completely new records for ten-kilometre square TQ57.

Tony also recorded moths at Shoreham in 1996, and most noteworthy of his discoveries here was the small purple-barred *Phytometra viridaria*. This is a scarce moth in our area and is now restricted to the very southern edge of the recording circle, with nine tetrads recorded in Surrey and, now, two in Kent. Though this is an easily overlooked insect, it is thought to have genuinely disappeared from many of its former sites, especially in Kent, as a consequence of loss of suitable habitat.

V.C. 17, Surrey

As usual, a large volume of records has been forthcoming from this vice-county area.

On the night of 26 June 1996, Keith Redshaw made a visit to Ashted Common to look for the heart moth *Dicycla oo*, in which venture he was

successful. What he perhaps did not realize the full significance of at the time was the capture of a single common fan-foot *Pechipogo strigilata* — last reported from Ashted in 1971 and last recorded in the London Area in 1972. This species was deemed by me in *LMLA* as 'most probably extinct in the London Area'. I am delighted to be proved wrong and reassign it to status category 4.

Meanwhile back in Banstead, 1995 produced four new species for Steve Gale. A rosy footman *Mitochondria miniata* on 6 July was also a new ten-kilometre square record; the larvae feed on lichens growing on trees and the insect is thus sensitive to atmospheric pollution. A cypress pug *Eupithecia phoeniceata* on 31 July was an unexpected arrival and is only the sixth example to be noted in the London Area — the last being in 1984. The status of this moth is uncertain in our area and though it seems most likely that this example, and the previous five, were all primary immigrants, the 1996 records (below) may indicate that the moth is establishing itself in the area. The single small mottled willow *Spodoptera exigua* which Steve captured on 10 October and the scarce bordered straw *Heliothis armigera* five days later most certainly were primary immigrants, however. The fourth newcomer was a dark-barred twin-spot carpet *Xanthorhoe ferrugata*, taken on 1 August. The following year saw a number of equally interesting species recorded. Apart from the immigrants already listed, there were three red-green carpets *Chloroclysta siterata* — on 11 September and 6 and 24 October; the last record here was of one on 12 November 1990. Three more cypress pugs were noted, on 5, 11 and 13 August as well as a host of other seldom seen species here.

Graham Collins, the Surrey Lepidoptera Recorder, has summarized the more notable records for the last few years. In particular he tells me of five confirmed Surrey localities for the yarrow pug *Eupithecia millefoliata* in addition to that made by Steve Gale at Banstead, mentioned in my last review (Plant 1995). The total of six recent Surrey records of this species are all well away from the South Essex/West Kent focus shown on the map in *LMLA* and the appearance of the moth at several sites in such a short space of time may indicate a genuine spread rather than a series of overlooked sites. The pimpinel pug *Eupithecia pimpinellata* has now been found at three Surrey localities in the London Area — at South Hawke (larvae on 5 September 1992), at Addington (larvae on 16 September 1992) and at Banstead Downs (adult on 22 July 1993, genitalia examined). The significance of these discoveries has already been discussed, above, as has that of the recent records of the square-spotted clay *Xestia rhomboidea*, which is reported from Buckland on 19 August 1992 and Headley Warren, where five came to light on 4 August 1994 and about ten were observed on burdock flowers on 29 July 1995.

Amongst the several noteworthy species Graham Collins recorded in his own garden were two of special interest. A dark spectacle *Abrostola trigemina* came to the light-trap on 8 August 1996 and is the first recent record for our portion of Surrey and only the fourth for the London Area in the post-1979 'current' period. A dotted chestnut *Conistra rubiginea* on the same night is also an important record; apart from a single example taken at North Cheam in 1987 and presumed to be a vagrant or an escape from breeding stock, this moth has not been seen in the London Area since 1974 and was regarded as perhaps extinct in this region in *LMLA*. Graham's record is not proof of breeding, but the status of the moth must nevertheless change from its current position in category 7A to category 10 (status uncertain). Seven other newcomers were the red-green carpet *Chloroclysta siterata* on 2 November 1994 and 21 October 1996, discussed more fully above, the dingy shell *Euchoeca nebulata*, an alder feeder noted on 9 June 1993, scarce prominent *Odontesia carmelita* on 22 April 1993, triple-spotted clay *Xestia ditrapezium* on 23 July 1993, the antler moth *Cerapteryx graminis* on 15 July 1994, the mullein shark *Cucullia verbasci* on 5 May 1995 and the lesser-spotted pinion *Cosmia affinis* on 1 August 1995. Several immigrant species have been listed in the earlier section of this review.

Bernard Skinner also took a dingy shell in his garden in Croydon on 9 June 1996, and on the same night a single example of the false mocha *Cyclophora porata* was also in attendance. This is the first London Area record since 1967; a fuller discussion has already been presented in the introduction to this review. An oak-tree pug *Eupithecia dodoneata* on 15 July the previous year completes the trio of new species for Bernard's garden during the period under review.

One of the most laudable pieces of field work carried out during 1996 was that by Derek Coleman and Martin Boyle, who embarked upon an examination of poplar trees in the London Boroughs of Sutton and Merton. As a result, they found no less than twenty-five new localities for the hornet clearwing *Sesia apiformis* in Sutton and three in Merton. These affected ten tetrads within square TQ26 and one in adjacent square TQ36 — a total of eleven new tetrad records raising the total from six to seventeen for the period since 1980. This is surely the most clear evidence that this moth is grossly under recorded in the London Area. I would especially request records of this species for 1998 (this review will not appear until the end of 1997) and am particularly interested in the central area. Records may be easily made in the winter. Look for old emergence holes at the extreme bases of hybrid black poplar trees in streets, parks and elsewhere. It is essential to part the vegetation/litter and examine the very base of the trunk as the holes are often absolutely at ground level.

David Gibbs went to Roundshaw Down Local Nature Reserve in Sutton Borough on 11 July 1996 and amongst other species noted the six-belted clearwing *Bembecia scopigera*. This represents only the fourth record in the Surrey sector (the third being that in 1977 by Donald Prance, mentioned below) and it is interesting that the moth was also found at three separate and apparently new localities in our portion of South Essex during the two years of 1995 and 1996.

Sir John Dacie has continued to trap in his very well-recorded garden at Wimbledon, but recorded no new species in 1995. He did, however, take a vestal *Rhodometra sacraria* on 14 October whilst other less frequently recorded species there in the year were the dark umber *Philereme transversata* on 21 July, the crescent *Celaena leucostigma* on 18 August and the oak lutestring *Cymatophorima diluta* on 9 September.

I was pleased to see a colour photograph of a red-belted clearwing *Synanthedon myopaeformis* taken at his home in Barnes by Frank Thornton. The moth appeared on the wall of the house in May 1995. The garden has a conference pear tree which seems a likely candidate for the source of the moth which would feed internally on the trunk or branches.

Adrian and Olivia Hall continued trapping at their cottage in Mugswell during 1996 and added a further thirteen species to their already impressive list of species. These were the shaded broad-bar *Scotopteryx chenopodiata*, the green carpet *Colostygia pectinataria*, scorched carpet *Ligdia adustata*, peacock *Semiothisa notata*, brown silver-line *Petrophora chlorosata*, puss moth *Cerura vinula*, sallow kitten *Furcula furcula*, vapourer *Orgyia antiqua*, least black arches *Nola confusalis*, tawny shears *Hadena perplexa*, small clouded brindle *Apamea unanimitis*, middle-barred minor *Oligia fasciuncula* and the fan-foot *Herminia tarsipennis*. Though some of these are notable only in their absence to date, others are more interesting. In particular the least black arches provides the fourth Surrey locality in the London Area for a species which is known in our area only from this small cluster of records in the south-west and from the Epping Forest area of both South and North Essex (see *LMLA*, page 135).

The overall list of Lepidoptera for Richmond Park rose to 546 species in 1996, thanks to the stalwart efforts of Mark Parsons who added over thirty new macros (as well as many new micros) through his continuing survey there in 1995 and 1996. These included several of particular note. For the first year, 1995, one of the most interesting was perhaps the goat moth *Cossus cossus*. This is an excessively rare species in the London Area and one which is thought to

be in general decline over the British part of its range. A single female found during the year is the first recent record for our area outside Kent and Essex and should perhaps be interpreted alongside the late record of the discovery of a larva at nearby Ham River Lands in 1975 by Donald Prance (see below). Of equally great interest was the capture of the silver hook *Deltote uncula* — a species which was considered possibly extinct in the London Area and has already been discussed more fully above. The shaded broad-bar *Scotopteryx chenopodiata* is a generally common species but seems to have declined over the last fifteen years or so. It was reported here for the first time in 1995 as it was at several other sites, perhaps suggesting that it is making some sort of comeback. The red-green carpet *Chloroclysta siterata* is another species on the increase, spreading eastwards across southern Britain. Mark added it to the Richmond Park list in 1995. Another particularly noteworthy addition to the Richmond Park list was the mottled grey *Colostygia multistrigaria*. *LMLA* shows only four recent localities for this moth, one in South Essex, one in West Kent and two in Surrey, though neither of the latter two is anywhere near Richmond Park. This fifth recent, widely-spaced record (involving two tetrads of the map) supports my contention in *LMLA* that it is probably under recorded as a result of its early flight period (13 March to 21 April recorded in the London Area), though it is likely to be genuinely scarce here and I see no reason to remove it from my status category 4. The pugs are also an under-recorded group, largely because many of them are somewhat nondescript and can only be satisfactorily identified after dissection of the genitalia. The addition of ochreous pug *Eupithecia indigata* (seventh recent record) and dwarf pug *E. tantillaria* (sixteen recent records at the end of 1996) also serves to illustrate the truth in the biblical expression 'seek, and ye shall find'! The Kent black arches *Meganola albula*, on the other hand, is rather unlikely to be discovered at many sites away from the Surrey sector. Its addition to the Richmond Park list brings the number of post-1979 records for the London Area to three. Finally for 1995, the southern wainscot *Mythimna straminea* was another interesting addition. The pattern of records for this species in relatively close proximity to the major rivers in our area is reinforced by this, our most westerly London Area record. Recording for 1996 added the red-belted clearwing *Synanthedon myopaeformis*, small emerald *Hemistola chrysoprasaria*, slender pug *Eupithecia tenuiata*, pine hawk-moth *Hyloicus pinastri*, varied coronet *Hadena compta*, the miller *Acronicta leporina*, dingy shears *Parastichtis ypsillon*, and slender brindle *Apamea scolopacina*. The double line *Mythimna turca* remains present in the Park with about sixty adults coming to light during the course of 1996. Because Richmond Park straddles a number of tetrads and two ten-kilometre squares, recording there has inevitably been uneven. Because of this, Mark Parsons' list adds 184 new tetrad records and thirteen new ten-kilometre square records for the two years under review and helps considerably in achieving a more complete picture of patterns of distribution.

In my last review, of the years 1992–1994 (Plant 1995), I made reference to Mark commencing actinic trapping at Stanton Road, Raynes Park — by which means he added sixty-five species to a completely unrecorded tetrad. He has continued this trapping and in 1995/96 added a further thirty-one species to the total for the tetrad. One of these, the white-line dart *Euxoa tritici*, also being a new record for the ten-kilometre square TQ26.

Finally for Surrey, Donald Prance has drawn my attention to two 'old' records which he did not send in time for publication in *LMLA*. The first of these is a six-belted clearwing *Bembecia scopigera* at Ham River Lands, by the River Thames, in August 1977. Mr Prance suggests that it is possible that the moth may have been introduced to the site with the imported infill; all our other records relate to chalkland sites. His other record, already mentioned in passing, is perhaps of greater interest and relates to a mature larva of the goat moth *Cossus cossus*, which he found crossing a path at Ham River Lands in

1975. The larva was quite some distance from the nearest tree and one is left wondering exactly what it was doing walking in the road. This record is some twenty years earlier than the Richmond Park adults mentioned above, but the two together suggest that this rare moth may still be a resident in that part of the London Area and if anyone cares to search for it I would be pleased to hear of both positive and negative results.

V.C. 18, South Essex

Some of the most important additions to the records have come from this sector of our area. A complete surprise was the capture of a single speckled footman *Coscinia cribraria* in the Rothamsted Insect Survey light-trap at Rhone-Poulenc Agriculture Ltd in Fyfield Road, Ongar on the night of 6 August 1996. It was identified by Adrian Riley as belonging to the immigrant subspecies *arenaria* Lempke. This species is not listed in *LMLA* and is entirely new to the London Area. It has already been discussed in the introduction, above.

David Miller has sent me a great deal of information on moths at the Essex Filter Beds in the Lea Valley, just inside vice-county 18. The most important of these by far was the dotted fan-foot *Macrochilo cribrumalis*, a specimen of which I was able to examine and confirm. In *LMLA* I assigned this species to status category 7A (former extremely local resident now probably extinct in the London Area) but tempered this with the words '... perhaps should be looked for in suitable habitat on the Stort and Lea in the north-east of the London Area, where it may just possibly still occur'. All I can say is that it is nice to be proved right some of the time! David Miller found this moth exactly where I suggested it should be searched for between 11 and 13 July 1996 with up to four moths being seen.

Brian Goodey, the Essex Lepidoptera Recorder for the Essex Field Club, passed to me an extensive list of macros made by Mrs J. G. Green at her home in Theydon Bois, at the edge of Epping Forest for the period from 1990 to 1996. Five of these are new to our portion of Essex (both vice-county areas) and warrant particular mention here. A dotted fan-foot came to the light-trap on 22 July 1996. This species has already been referred to in the above paragraph and in the introduction; surely this example here must have wandered from the Lea Valley? The dwarf pug *Eupithecia tantillaria*, like most pugs other than those few which are distinctive, is doubtless under recorded. *LMLA* shows nine localities south of the Thames in the period since the end of 1979, together with four north of the river, one in Bucks. and three in Middlesex. Mrs Green took one in her garden on 2 May 1994 (identified by Brian Goodey) and so added Essex to the areas in which it is reported. The distinctive clouded magpie *Abraxas sylvata* took a downward turn with the demise of elm trees in the 1970s, but in recent years has shown signs of a partial come-back. One turned up at Theydon on 21 July 1990. The peacock moth *Semiothisa notata* arrived as a singleton on 29 June 1992 and a bordered beauty *Epione repandata* came on 11 August 1994. Though not new to our Essex segment, several additional species are equally noteworthy in that they have only been recorded in this sector once or twice before. The cloaked carpet has only one Essex-in-London station since 1946 — at Belhus Country Park — though there is a single open circle on the distribution map representing a very old Epping Forest record. Mrs Green took a single specimen at her light on 5 August 1996. The ruddy carpet *Catorhoe rubidata* came to light on 14 June 1995 as a single example. The only other Essex records are from Thorndon Park in 1973 and Grays in 1985, both detailed in *LMLA*. A single southern wainscot *Mythimna straminea* was noted at the light on 12 July 1995, and apart from a single Surrey record noted in *LMLA*, is the first record made truly away from riverside habitats. The dusky-lemon sallow *Xanthia gilvago* is thought to be a declining species in the London Area, so it is very pleasant to see it on the Theydon list,

as three examples on 29 September 1990; the moth is recorded from only one other Essex locality since 1979. The closely related pale-lemon sallow *X. ocellaris* was taken by Mrs Green on 11 October 1995 and brings the post-1979 Essex-in-London sites to a total of four. An example of Webb's wainscot *Archanara sparganii* was taken on 26 July 1995, and like *M. straminea*, is away from its more usual riverside areas (the identification was verified by Brian Goodey). Finally, the waved black, a species currently extending its range over a wide area, was noted on 12 July 1993. A further forty species trapped by Mrs Green from 1990 to 1996 provided the distribution maps with new tetrad records and she is to be congratulated for all her hard work in running her trap every night of the year and in presenting a list not only with names, but complete with first and last dates and numbers of individuals trapped in total. We look forward to the 1997–98 returns with the greatest possible interest. If only everyone else would send in records like these!

A newcomer to moth recording, Mrs K. M. Black, has kindly sent me a number of records from her garden at Barkingside. Though these are all of common species, twelve are particularly welcomed as new records for tetrad 49K. Of these, the most interesting are the old lady *Mormo maura* and the spinach *Eulithis mellinata* — both adding a dot in voids on the distribution maps.

Clive Griffin has sent me a list of sixty-two macro moths from his parents' garden at Hainault in 1995, and most of these are new tetrad records. Notable is the chocolate-tip *Clostera curtula* on 14 April; this species is discussed more fully elsewhere in this review. The black rustic still continues its spread across the north-east of our area and Clive recorded five at Hainault during 1995, from 29 September to 21 October. The typical form of the crescent *Celaena leucostigma* provided a new ten-kilometre square record with a single example on 11 August as did the three separate examples of the maiden's blush *Cyclophora punctaria* on 22 July and 4 and 18 August.

In *LMLA* I stated that the maiden's blush was declining in the north-east of the London Area. I stand by that statement as a summary of what was happening at that time, but in the last couple of years the decline has evidently reversed and the moth is appearing in a variety of places where it was apparently absent before. One further such example is Chingford, where Bryon Pateman took a total of eleven examples between 20 and 31 July 1996, with a peak of five on 30 July. Other notables from Mr Pateman's garden included the chocolate-tip *C. curtula* which has already been mentioned above, the least carpet *Idaea vulpinaria* with twenty-five examples between 2 and 30 July in the same year, and two heart and clubs *Agrotis clavis* — one on each of 3 and 4 July. This latter moth is more normally associated with calcareous ground south of the Thames.

Peter Harvey netted a single example of the six-belted clearwing *Bembecia scopigera* whilst surveying aculeate Hymenoptera on Barking Level during 23 July 1996. A second example was taken there by myself two days later. The previous year I encountered this moth at Dolphin Chalk Quarry in Purfleet on 29 June and at Mill Wood Sand Pit, Grays on 19 July. This latter site is distinguished by its being one of the best sites in Britain, if not the best, for aculeate Hymenoptera, with over seventy per cent of the British fauna represented. It is currently (February 1997) being levelled for housing development.

V.C. 19, North Essex

Bill Last has continued to operate his trap at Long Ley, Harlow during the two years covered by this review and has added many more dots to the distribution maps as a result. The London portion of North Essex remains drastically under recorded, however, and all records from elsewhere in this section of the map are particularly sought. A least carpet *Idaea vulpinaria* was

noted by Bill on 28 June 1996 with another on 21 July in the same year; this is well away from the main east London focus for this species. A gem *Orthonama obstipata* taken on 7 June 1996 and bordered straws *Heliothis peltigera* on 8, 9 (two), 15, 17, 20 and 22 June represent the immigrants recorded. The silver Y *Autographa gamma* was present from 6 June to 7 September in 1996, with a total of 282 individuals trapped, though the trap did not operate every single night. Two were taken on 6 June, one on the next night and then sixty-five on 9 June, strongly suggesting an immigration on that date.

Apart from Bill's records the only other information from this vice-county area within London is from Parndon Wood Nature Reserve, also at Harlow, where I ran a light at a public moth-recording session on 19 August 1995 and managed to catch a female great brocade *Eurois occulta* as well as many very common species.

V.C. 20, Hertfordshire

Rob Souter recorded moths at Bayfordbury from March to July 1992 and has now sent me his list. Most interesting amongst these is the chocolate-tip *Clostera curtula* — only the second record for our part of Hertfordshire. This attractive moth is moderately widespread south of the River Thames and in the western edge of our recording area, but is generally absent from most of the northern and central areas, being extremely local and scarce where it does occur. The same species was also noted during 1995 at Waltham Cross by A. J. Downie, whose list of records was kindly forwarded to me by Rob Souter. It is not at all clear if this species has merely been overlooked in the north of our area or if it has moved into new areas from where it was previously absent. It is absent from Mr Downie's 1994 list for the same site.

David Gibbs visited the Borehamwood area on 4 June 1996 with his mv trap and recorded a number of species, amongst which two were of especial interest. The marsh pug *Eupithecia pygmaeata* was a complete surprise, a new ten-kilometre square record and only the third locality for the London Area, firing speculation that this small brown moth may be rather more overlooked in our region than we had previously thought. The larvae feed on the flowers and seed-heads of *Stellaria* and *Cerastium* (only so far recorded from *Cerastium arvense* in the London Area), in June and July, and the pupa overwinters (sometimes more than once) to give adults in May and June. This is certainly a moth worth looking out for, at least in the southern part of Hertfordshire. David's second species of interest at Borehamwood was the small yellow underwing *Panemeria tenebrata*. This is the ninth locality for the species north of the Thames in our area and only the second in our portion of Hertfordshire. However, I have already stated in *LMLA* that this species, a day-flier, is very easily overlooked and is likely to be drastically under recorded.

Another provider of records of common species over a wide area is Colin Everett. His most valuable contribution from Hertfordshire for 1995 included the small yellow underwing *Panemeria tenebrata* from Bricket Wood on 21 May, a seldom-recorded moth which is surely more common than the records indicate? He was also fortunate in securing two specimens of the orange underwing *Archiearis parthenias* from several flying high amongst birch trees at the same site during April, thus enabling confirmation of the identification. In the same month, and at the same site though not in the same spot, he also encountered another example on the ground, examined it, and realized that he also had the light orange underwing *A. notha*. When one considers how few of us have ever enticed either species down from the treetops for a positive identification, a certain feeling of envy creeps in at the thought of somebody confirming both species at the same site in the same month!

Maurice Pledger, Phil Jeffrey and Scott Paynter recently began light-trapping in the Hertfordshire area of the London recording circle. Three separate

examples of the waved black *Parascotia fuliginaria* showed up on the three dates 27 July and 20 and 23 September 1996, demonstrating the current spread of this species. A pine hawk-moth *Hyloicus pinastri* here on 20 July 1996 is the first in our part of Hertfordshire for another expanding species, whilst black arches *Lymantria monacha* here and at Broxbourne Woods provide only the second and third localities for this county area. A privet hawk-moth *Sphinx ligustri* on 23 September is the first ever for our part of Hertfordshire vice-county. A currant clearwing *Synanthedon tipuliformis* in a garden at Hoddesdon is only the second recent record of this species in Hertfordshire-in-London. The gothic *Naenia typica* must surely be overlooked in this northern county area, their record from Broxbourne Wood on 31 August being a new species for the area. Perhaps the most unexpected record, however, was of a pretty chalk carpet *Melanthia procellata* at Easneve on 14 July 1996. This is well away from the known range of this species in the London Area which occupies a band of sites across Surrey and West Kent on the chalk of the North Downs, with one isolated record on the Chiltern chalk near the border of Herts. and Bucks. This present record is only the second north of the River Thames. Migrants noted by the trio of trappers are listed in the immigrants section, above, and include a golden-rod brindle *Lithomoia solidaginis* on 7 September 1996 at Broxbourne Woods.

V.C. 21, Middlesex

The addition to the London list of the willow-herb hawk-moth *Proserpinus proserpina* at Wapping on 18 July 1995 by Tom Moore has already been mentioned in the introduction, above. Its presence here came as a total surprise to everyone and necessitates adding the species to the published British check-list.

The goat moth *Cossus cossus* has been mentioned very briefly for this vice-county area in the introduction. Chris Slack, the Ecology Ranger at Bedfont Lakes Country Park, just south of Heathrow Airport, ran a light-trap for the first time here on 16 June 1996 and was rewarded with a goat moth amongst the several common species also present.

David Rear has sent me a small number of new tetrad records from the West Hampstead area of north London — a heavily urbanized area. These are especially interesting since they are from a Heath trap placed on a second-floor window-sill rather than at ground level in a garden. New macros for the tetrad include the blood-vein *Timandra griseata*, brindled pug *Eupithecia abbreviata*, dingy shears *Parastichtis ypsilon* and the immigrant sword grass *Agrotis ipsilon*.

From Bishop's Wood at Harefield, Dr Ched George reports the first ever record there of the merveille du jour *Dichonia aprilina* on 14 October 1995; this is interesting as Ray Softly also took one at Hampstead for the first time in 1996. The two records may perhaps indicate the start of an increase in this very distinctive and somewhat attractive species. Ray Softly also captured an example of the green arches *Anaplectoides prasina* on 11 July 1996 in the actinic trap on his balcony on Parliament Hill, adjacent to Hampstead Heath. This is our only current record north of the River Thames and is completely new to Middlesex. Three open circles on the distribution map in *LMLA* represent old records from Essex (1) and Buckinghamshire (2). South of the Thames, there are recent records from nine sites in Surrey and two in West Kent, though the moth may be under recorded in these areas. Ray also noted several other species of some interest including the blotched emerald *Comibaena bajularia* in his balcony actinic trap on 13 July 1996 — a first for this site and a new tetrad record.

Anna Hughes continues trapping at Enfield and took a bordered straw *Heliothis peltigera* on 8 June 1996. She has also informed me of an earlier record of the scarce bordered straw *H. armigera* taken by her at Enfield on 2 August

1992, which was not mentioned in my last review; I am happy to put this right now.

A newcomer to moth surveying is John Hollingdale, whose new trap at Harrow fills an important gap in the network. His many records of relatively common species add many new tetrad records and he has been rewarded for his efforts by the capture of a single male red-green carpet *Chloroclysta siterata* on 29 October 1996. This represents the first Middlesex record since one was taken in the Muswell Hill area prior to 1898, almost a hundred years ago. This species is more fully discussed in the introductory section of this review. A large ranunculus *Polymixis flavicincta* taken by John on 29 September 1996 was only the second Middlesex record in recent years and only the fourth for all time; the moth is quite common in parts of Kent and Surrey, but seems to be genuinely absent from much of London north of the Thames, though it is present and fairly common in my part of Hertfordshire, to the north-east of the London Area just beyond the boundary.

Paul Wheeler is another newcomer, sending me his records for the first time to cover the start of trapping in the Edgware/Burnt Oak area of north London and in so doing adding a very large number of dots to the maps for three previously completely unrecorded tetrads. Unfortunately he did not get any rarities in his first year, but he can rest assured of two things — first that in the fullness of time he probably will and second, his records are an extremely valuable addition to our knowledge of moths in the urban area. We look forward to the 1997 and 1998 records with eager anticipation.

Andrew Wood has sent me an impressive list of moths taken at his garden in Yiewsley at the extreme west of Middlesex vice-county in a poorly recorded tetrad. His list adds nearly 140 new dots to the map. Most of these relate to common species, of course, but a few are of greater interest. Four species, the mallow *Larentia clavaria*, phoenix *Eulithis prunata*, brown-tail *Euproctis chrysorrhoea* and rosy minor *Mesoligia literosa* are new to the ten-kilometre square TQ08. Other interesting records include the currant clearwing *Synanthedon tipuliformis*, small emerald *Hemistola chrysoprasaria*, August thorn *Ennomos quercinaria*, small elephant hawk-moth *Deilephila porcellus*, the gothic *Naenia typica*, dog's-tooth *Lacanobia suasa*, hedge rustic *Tholera cespitis*, and the waved black *Parascotia fuliginaria*.

V.C. 24, Buckinghamshire

David Rear has sent me some new tetrad records of day-flying moths from casual observations whilst out and about. These include a strong colony of six-spot burnet *Zygaena filipendulae* at the Old Slade Nature Reserve, and the speckled yellow *Pseudopanthera macularia* at both Black Park and Northmoor Hill Wood as well as others.

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Survey of Bookham Common

FIFTY-FIFTH YEAR

Progress Report for 1996

Contents

General.....	175
Vegetation.....	176
Fungi.....	177
Bats.....	177
Birds.....	178
Butterflies.....	180
Beetles.....	183
Bugs.....	184
Bush-crickets.....	184
The divisions of Bookham Common.....	185
Record card and map.....	187
Contributors' addresses.....	189

General (Ian Menzies, Chairman, Bookham Common Survey)

The year 1996 was characterized by unusually cold weather in May and the continuation of low rainfall experienced in recent years. As a result the natural history calendar was delayed by some two to three weeks, for instance hawthorn blossom commencing during the second and third weeks of May and the purple emperor butterfly *Apatura iris* not putting in an appearance until the middle of July. During most of the year the celebrated Bookham clay remained cracked and hard as iron, however water levels were sustained and we did not see pond margins drying out in the way they did in 1995.

Perhaps the most notable feature for 'Bookham natural history 1996' was the appearance of the painted lady butterfly *Vanessa cardui* in large numbers during the last few days of a cold May: no doubt this mega-migration, which affected the whole of Europe, was related to Mediterranean conditions rather than the weather further north. The larvae were noted during June and the butterfly was abundant during July, disappearing somewhat abruptly in August.

The second notable development concerned the silver-washed fritillary *Argynnis paphia* which appeared in something like the numbers seen in the 1950s (see Ken Willmott's account). It was a real pleasure to see this species back again and to witness the confident behaviour of a male successfully 'seeing-off' a large brown hawker dragonfly *Aeshna grandis* that had strayed onto questionable territory in the glade on 31 July. This return could be regarded, at least in part, a result of the recent tree-thinning management policy in the wooded areas which has been accompanied by an increased growth of violet, the fritillary's foodplant.

Attendances on the Bookham days (second Saturday in each month) have been well maintained during the year (Figure 1) as evidenced by a need for more chairs in the LNHS hut! Though numbers attending the organized field study events have been variable, enthusiasm has been high. The survey team wish to continue them, but consider that it would be more convenient if they were organized to occur, where possible, on the Bookham Saturdays.

Details concerning various aspects of Bookham Common natural history are presented for 1996 under the following headings: vegetation (Ken Page), fungi (Audrey Thomas), bats (William Landells), birds (Ron Kettle), butterflies (Ken Willmott), beetles, bugs, bush-crickets (Ian Menzies), Bookham Common divisions (Bryan Radcliffe), and record card and map (Ian Menzies). It is not always possible to cover all the main areas on each occasion; the present report, for instance, does not cover mammals, dragonflies or moths due to a temporary



FIGURE 1. Participants on a winter's Bookham day break for lunch by the Society's hut.

Photo: Doreen Owen

absence of experts and information in these fields. Coverage and the stimulation of interest does depend upon the appearance of volunteers who are willing to spend some of their time on the Common and such persons will always be very welcome.

Vegetation (Ken Page)

In 1995 we reported finding a possible *Agrimonia* hybrid between *A. eupatoria* and *A. procera*. The following year a cytological investigation of root material from the Bookham plant was undertaken by Leicester University. Their findings showed the plant to be 'good' *A. procera* $2n = 56$. As *A. eupatoria* has $2n = 28$ the hybrid should have $2n = 42$ as was the case with the plant found in Northumberland in the 1940s. Professor Stace says it is possible for $2n = 28$ to give all its chromosomes to its offspring, with the normal reduced (28) from $2n = 56$. In this event the plant would certainly be a hybrid between the two species, but would have the same number of chromosomes as one of them, and other features would be required in order to establish its identity. In view of the extraordinary vigour of the Bookham plant (considerably more than a metre in height) and its complete sterility, could this be a satisfactory explanation of the plant's hybridity?

Viola odorata sweet violet has flowered well on the Common this year. In the recent past grazing by rabbits has seriously reduced flowering. In addition to the normal deep violet flowers we have sizeable areas of the white-flowered var. *dumetorum*. This can be distinguished from another white var. *imberbis* (which we have not so far found on the Common) by tufts of hairs on the lateral petals. The combination of the contrasting colours creates a very pleasing effect.

Although the Survey here is more than fifty years old, new discoveries are still being made. A yellow-fruited form of the common holly *Ilex aquifolium* was recently found by The National Trust staff. It appears to be spontaneous and is probably forma *bacciflava*. It may be rare as a native plant.

Cynoglossum germanicum green hounds-tongue is certainly a British rarity; it

is also a new plant for Bookham Common. There is a large colony on Leatherhead Common a few miles away, but its appearance here should be viewed with suspicion. The hooked bristles of the fruit are ideally suited for distribution by animals, but human transportation cannot be ruled out. We think it flowered for the first time on the Common last summer and has produced at least a dozen new plants. A significant increase in plants at this site may be anticipated.

Fungi (Audrey Thomas)

In 1996 no new or rare fungi were discovered, but the fruiting body of *Chlorosplenium aeruginascens* was seen in July, which is not often found.

The Bookham Common 'fungus foray' was led by Audrey Thomas on 28 September, and concentrated on the Eastern Plain area. The following twenty-five species were found, of which perhaps the most interesting was *Tyromyces caesius* which is not common and used to be known as *Polyphorus* or *Leptoporus caesius*.

List of species seen

<i>Amanita muscaria</i>	<i>Armillaria mellea</i>
<i>Leccinum scabrum</i> and <i>L. versipelle</i>	<i>Collybia butyracea</i> , <i>C. dryophila</i> and <i>C. radicata</i>
<i>Galerina mutabilis</i>	<i>Gymnopilus junonius</i>
<i>Hypholoma fasciculare</i>	<i>Paxillus involutus</i>
<i>Pleurotus ostreatus</i>	<i>Pluteus cervinus</i> and <i>P. salicinus</i>
<i>Psathyrella hydrophila</i>	<i>Russula aeruginea</i> , <i>R. claraflava</i> , <i>R. cyanoxantha</i>
<i>Coriolus versicolor</i>	and <i>R. ochroleuca</i>
<i>Daedalia quercina</i>	<i>Daedalopsis confragosa</i>
<i>Stereum hirsutum</i>	<i>Piptoporus betulinis</i>
<i>Scleroderma verrucosum</i>	<i>Tyromyces caesius</i>

Bats (William Landells)

Consultations with the LNHS mammal recorder, the Surrey Wildlife Trust and the London Bat Group recorder show a total lack of chiropteran records on Bookham Common itself. This is perhaps surprising given the long association of the LNHS with this area. Recent technical advances have greatly facilitated the field recording of this difficult mammal group. Anecdotal records, such as those given by Ian Swinney in the Bookham report for 1995, are available and there is no reason to doubt their validity, particularly since they accord with what might be expected from the area. Whilst there are probably personal or English Nature data on roosts in the neighbourhood of the Common, these have not been collated. A short series of visits during 1995/96 was made and all records are given below.

Noctule *Nyctalus noctula* (Schreber)

1	28.vi.1995	Feeding over IoW Pond, two passes about 22.35 hrs.
1	1.v. 1996	Commuting over Bayfield Plain (area Q) 21.15 hrs.
2	9.vii.1996	Two passes over IoW Pond (area N) 21.25–30 hrs.

Daubenton's bat *Myotis daubentonii* Kuhl

3	28.vi. 1995	Feeding over IoW Pond (area N) about 22.35 hrs.
2 + 2	1.v. 1996	Feeding IoW and W Hollow Ponds (area N) 21.10 and 23.00 hrs.

Pipistrelle *Pipistrellus pipistrellus* (Schreber)

55 kHz + + 28.vi. 1995 Multiple contacts (minimum 7), Ponds, Eastern

			Plain and S-Eastern Wood (areas N, T, S) 22.10–23.00 hrs.
6 +	1.v. 1996		Multiple contacts (minimum 6), Hill House Wood, Ponds and Bayfield Plain (areas D, E, N, Q) 21.00–22.30 hrs.
1	1.v. 1996		Feeding Bank's Common track (area O) 21.05 hrs.
8 +	9.v. 1996		Multiple contacts (minimum 6), Hill House Wood, Ponds, Bank's, Isle of Wight and Bayfield Plains (areas D, E, N, O, P, Q) 21.38–23.00 hrs.
45 kHz 1	1.v. 1996		Feeding along Bank's Common track (area O) 21.00 hrs.

Serotine *Eptesicus serotinus* (Schreber)
1 28.vi. 1995 Feeding along Common Road North (area E)
 22.55 hrs.

Considerable use of the tracks is made by pipistrelle bats for feeding purposes. It will be interesting to observe the effects of scrub clearance and regeneration on future feeding behaviour.

These limited records tend to confirm that Bookham Common is used as a feeding area by both pipistrelle and Daubenton's bats. The records of noctule are too few for meaningful comment and possibly represent commuting bats. The status of both serotine and brown long-eared bats *Plecotus auritus* (Linnaeus) remains to be clarified. Several unidentified *Myotis* have been heard and it is possible that at least two other *Myotis* species use the Common. It is intended to run a fuller survey in 1997. In the future it would be helpful if all sightings of bats could be passed to myself with as much detail as possible and I would hope to follow up such sightings promptly.

Birds (Ron Kettle)

This has been an interesting year, with coverage considerably improved by the participation of Dr Alan Prowse and Roger Suckling, both local residents, and the continued monitoring counts by Nick Murphy and Peter Crook. But to start as usual with the Common Birds Census in the 16-hectare Eastern Wood, ten visits were made in the breeding season, most of them jointly with Roger Suckling, and the number of territories estimated for each species by the BTO in their analysis of the results were:

Sparrowhawk	<i>Accipiter nisus</i>	1	Goldcrest	<i>Regulus ignicapillus</i>	1
Pheasant	<i>Phasianus colchicus</i>	3	Long-tailed tit	<i>Aegithalos caudatus</i>	5
Stock dove	<i>Columba oenas</i>	1	Marsh tit	<i>Parus palustris</i>	2
Green woodpecker	<i>Picus viridis</i>	1	Coal tit	<i>Parus ater</i>	3
Great spotted woodpecker	<i>Dendrocopos major</i>	3	Blue tit	<i>Parus caeruleus</i>	26
Wren	<i>Troglodytes troglodytes</i>	15	Great tit	<i>Parus major</i>	13
Dunnock	<i>Prunella modularis</i>	1	Nuthatch	<i>Sitta europaea</i>	2
Robin	<i>Erithacus rubecula</i>	43	Treecreeper	<i>Certhia familiaris</i>	1
Blackbird	<i>Turdus merula</i>	13	Jay	<i>Garrulus glandarius</i>	5
Song thrush	<i>Turdus philomelos</i>	2	Magpie	<i>Pica pica</i>	2
Mistle thrush	<i>Turdus viscivorus</i>	1	Carrion crow	<i>Corvus corone</i>	2
Blackcap	<i>Sylvia atricapilla</i>	6	Chaffinch	<i>Fringilla coelebs</i>	7
Chiffchaff	<i>Phylloscopus collybita</i>	3			

Woodpigeons *Columba palumbus* and starlings *Sturnus vulgaris* nested but were not censused. Collared dove *Streptopelia decaocto*, cuckoo *Cuculus canorus*, lesser spotted woodpecker *Dendrocopos minor* and bullfinch *Pyrrhula pyrrhula* were present, but did not hold a breeding territory on the plot.

After the cold winter, wrens declined to their lowest total since 1965 (excluding the incomplete census in 1994) and robins were down a little from their high number in 1995, but many species showed increases. Blackbirds were

up by three to their highest figure since 1990, blackcap numbers doubled to six, the highest since 1984, long-tailed tits had a record five territories, blue tits were up by six, great tits by three and chaffinches, up three, recovered to their best total since 1972. There were many sightings of sparrowhawk over the wood and they probably nested there; marsh tit, dunnoek and stock dove also had territories again. It is possible that more edge territories were included, and there were two of us on most visits, but there is no doubt that there were genuine improvements in numbers.

The estimate of occupied grey herons' *Ardea cinerea* nests increased considerably to at least 17 and possibly 18, partly because Alan Prowse found another group which was almost certainly present but overlooked in previous years.

Estimates were made of the minimum number of breeding territories held by some species over the whole Common:

Stock dove 4, turtle dove *Streptopelia turtur* 3, cuckoo 3, nightingale *Luscinia megarhynchos* 7, song thrush 13, lesser whitethroat *Sylvia curruca* 2, whitethroat *Sylvia communis* c.25, garden warbler *Sylvia borin* 11, blackcap 25, chiffchaff 17, willow warbler *Phylloscopus trochilus* 30, goldcrest 9, nuthatch 10, treecreeper 9, marsh tit 5, coal tit 10, chaffinch 21, goldfinch *Carduelis carduelis* 4, bullfinch 12.

The data from Peter Crook's Standard Walk Counts tend to confirm that there was an increase in whitethroats, willow warblers and blue tits since the previous year, and suggest a decrease in chiffchaffs and magpies and an increase in jays and bullfinches, but too much should not be read into just two years' figures.

A woodcock *Scolopax rusticola* was roding from early March to early June and one was accidentally flushed by Sheepbell Pond on 20 May; at least two pairs of lesser spotted woodpeckers were present, although one probably nested just off the Common; two pairs of pied wagtails *Motacilla alba* bred; a grasshopper warbler *Locustella naevia* sang on Bayfield Plain between 21 April and 15 May and two were heard and seen on 27 April; a pair of wood warblers *Phylloscopus sibilatrix* bred successfully in South-East Wood and another male was singing in Hill House Wood during early June; from there came the only sighting of a spotted flycatcher *Muscicapa striata*, on 3 June; a willow tit *Parus montanus* was seen calling and singing on the plains by AP on 27 April but not subsequently. Forty-two magpies were counted going to roost on Central Plain on 12 January. Groups of jackdaws' *Corvus monedula* nests were discovered in South-East Wood, Eastern Plain and Hill House Wood, and on the edge of the Common at Five Halls Farm, Stents Lane, Sheepbell Farm and Mark Oak; and rooks *Corvus frugilegus* were again seen in noisy gatherings with jackdaws and carrion crows in the treetops in Eastern Wood and along Hollow Path, this year in June. A dense flock of over 500 starlings, mostly juveniles, was swarming in the treetops on 11 June. There was a pair of linnets *Carduelis cannabina* on Bayfield Plain in April, with the male still singing on 27 April; to add to recent occasional observations of hawfinches *Coccothraustes coccothraustes* in winter, there were two records in the breeding season: one seen flying from Eastern Plain to Hollow Wood on 7 April and one heard in Hill House Wood on 3 June by AP; a male reed bunting *Emberiza schoeniclus* sang from at least late April until mid June, and a female was seen elsewhere on 25 September.

A kingfisher *Alcedo atthis* was glimpsed on the Isle of Wight Pond on 4 July, and there was a grey wagtail *Motacilla cinerea* there on 12 January; a female wheatear *Oenanthe oenanthe* was spotted on Bayfield Plain on 11 May. There were small flocks of fieldfares *Turdus pilaris* and redwings *Turdus iliacus* on the Plains in February, with 60+ redwings on 30 March and c.40 on the field beside Broadway South as late as 6 April. At the end of the year there were over 100 redwings and a few fieldfares feeding on berries in icy weather.

On the ponds, a little grebe *Tachybaptus ruficollis* stayed on Isle of Wight Pond during April and until at least 18 May, while another bird was on Eastern

Hollow Pond from at least 24 April until 2 May; two pairs of Canada geese *Branta canadensis* bred, with broods of six on Isle of Wight and five on Western Hollow on 8 May which later joined together, the two pairs being seen with nine young in June; there were five mandarin ducks *Aix galericulata* on the Eastern Ponds in January, a pair on Isle of Wight in April and on Upper Eastern on 8 June, and the presence of a female with three juveniles on Eastern Hollow proved breeding. A pair of teal *Anas crecca* was noted on Western Hollow on 9 November; there were broods of mallard *Anas platyrhynchos* on all four ponds along Hollow Path and twenty-five birds had congregated on Isle of Wight on 10 August when the other ponds were dry; two male and a female tufted duck *Aythya fuligula* were an unusual sight on Isle of Wight on 30 March, and a pair stayed until May. Pairs of moorhens *Gallinula chloropus* were present on most ponds and broods were noted on Isle of Wight, Western Hollow, Upper Eastern, Sheepbell and Bayfield; and coots *Fulica atra* nested on Isle of Wight, Western and Eastern Hollow and Lower Eastern Ponds.

Butterflies (Ken Willmott)

Spring 1996 was the third consecutive disappointing spring. It was a cold, dull March for the early hibernators such as the small tortoiseshell *Aglais urticae*, comma *Polygonia c-album* and peacock *Inachis io* to struggle out from hibernation, pair and lay eggs. The last species normally waits until the latter part of April to pair and early May to deposit egg batches — very wise in the spring of 1996. The orange underwing moth *Brephos parthenias* also had little opportunity for consistent flights, pairing and laying eggs on the birch trees *Betula* sp. April temperatures were not exceptional either, reaching the mid sixties or low seventies on only four occasions. It was late May before the weather showed any real signs of settling, thus the spring of 1996 gave little opportunity for the earlier species to prosper.

Despite this early setback, the poor spring was followed by a fine summer, leading to some very interesting and unusual Lepidoptera events on the Common. Two of the most interesting and spectacular were the relative abundance of the silver-washed fritillary *Argynnis paphia* (Frontispiece) and very definite abundance of the painted lady *Vanessa cardui*. In contrast to these events, and no doubt due to the cold sunless spring having an effect on this species, the purple emperor *Apatura iris* emerged later in July than I have ever recorded. However, numbers were only perhaps a little below average and with the two main territories regularly inhabited by two or more disputing males. I always use this observation as a useful indicator to how this species is faring. In the great season of 1983 there were up to **thirteen** different males on the territory, all seen in one magnificent observation, the leader of the group being the all-black variety *iole*!

In the 1995 season the silver-washed fritillary showed only minimal signs of recovering from its patchy distribution on the Common with records usually as singletons. In that year it peaked at four sightings on 8 July, all of which were males. No females were observed and only a single one the year previous at Mark Oak. However, 1996 was very different and they were readily observed and widespread on the Common, especially in the Mark Oak area (Figure 2) on 26 July, I. Menzies, and twenty plus three females, 18 July, K. Willmott. A female was seen showing interest in ovipositing activities on the eastern side of the Common, although she was persistently pursued by an interfering male that had other ideas. The somewhat patchy distribution of violets, the larval foodplant of this species, was good in this small area and it may be possible to conclude a successful search for larvae in May 1997. The improvement of silver-washed fritillary on Bookham Common was synchronous with other localities in Surrey, some of which even produced the fine greenish form of the



FIGURE 2. The Mark Oak area of Bookham Common is a favoured haunt of both purple emperor and silver-washed fritillary butterflies.

Photo: K. J. Willmott

female, *valezina*, which is very unusual away from its more western and southern haunts, such as the New Forest and surrounding regions.

The spectacular immigration of the painted lady has already been well documented in the literature and by the media. Bookham Common also experienced the massive influx. Thistles were alive with the larval stages and females were still depositing eggs on 26 June, almost a month since the first 'hordes' had arrived. The large number of different plants utilized by ovipositing females gives a clue to its worldwide distribution and occasional superabundance, the likes of which it is difficult to imagine ever seeing in the British Isles again — but who knows with the supposed effects of the global warming process. Such events may become commonplace. Its congener, the red admiral *Vanessa atalanta*, was for once outnumbered by the painted lady often ten or twenty to one!

The purple emperor was first observed on 13 July (3 July 1995, 30 June 1994) quite the latest emergence I have ever recorded on the Common. As a result it flew pretty late and one was observed by LNHS members on 10 August as it flew over the hut at Merritt's Cottage (I. Menzies). The only sighting of a probable female, seen at head height by myself, was at Mark Oak on 26 July.

A brief encounter, but the lumbering, flapping, then gliding flight suggested a female in search of sallow for ovipositing. One could normally be confident of seeing this species if searching on or around 10 July most years, although during the past five or so years Midsummer's Day in June has been worth a look!

The white-letter hairstreak *Strymonidia w-album* was also late on the wing, with a singleton being seen and a pupa found on 26 June. On 6 July, during the LNHS Field Study Day, about a dozen were observed near Bank's Common. This included two individuals at low elevation feeding on creeping thistle *Cirsium arvense* and hogweed *Heracleum sphondylium*. There was no significant increase in the incidence of Dutch elm disease noted, with the possible exception of some of the Bank's Common elms *Ulmus* sp. The situation still needs careful annual monitoring.

The white admiral *Ladoga camilla* was first observed on 26 June, but not emerging in considerable numbers until 6 July, when over a dozen were recorded from various parts of the Common. They were observed depositing eggs on honeysuckle *Lonicera* on 12 July. By 18 July the population had peaked and eggs were easy to locate. My annual twenty-minute 'frequency' count, undertaken in the same woodland ride each year, gave results of 19 and 21, marginally up on 1995 figures, but below those of 1994. They suggest a steady trend and that recent tree-felling projects on the Common are not having any significant effects on the population of this most desirable resident.

Despite the poor spring weather, the hibernating nymphalids did reasonably well, with three larval groups of the peacock, of various size, being located on the stinging nettles *Urtica* on 26 June, and also on the same date a fine golden pupa of the small tortoiseshell attached to a nettle leaf. A dozen or more second-generation small tortoiseshells were observed on 18 July.

The grizzled skipper *Pyrgus malvae* (Frontispiece) is at present in low numbers on the Common, but it is hoped that current clearance work by the warden, Ian Swinney, will improve conditions for them.

Purple hairstreaks *Quercusia quercus* were late appearing with ten or more being found on 19 July, several of which were kicked up from ground level, indicating that they were freshly emerged. When ready to pupate the larvae of this species comes off the oak leaves and is sometimes found within ants' nests. In comparison to 1995 their numbers were well down, with approximately twenty being the highest total seen on a circuit of the Common. This was probably due to the slow development of the larva during the cold spring, leaving them open to predation from foraging birds for a longer period than normal. Spring infestation of the oaks by the green tortrix moth *Tortrix viridens* may also have an impact on July populations of the purple hairstreak.

The species whose larvae are grass feeders in the larval stage, such as the *Thymelicus* skippers and the browns of the Satyridae fared better than expected after the cold spring and dry summer of the year previous. The ringlet *Aphantopus hyperantus* improved a little from recent years, but again appeared later than normal with only a few on the wing on 6 July, but over seventy counted on 18 July. On the same date the gatekeeper *Pyronia tithonus* was beginning to emerge and three days later the population still consisted of males only. This was a good example of protandry, where numbers of males emerge several days before their female counterparts in a population, allowing them to establish territories or patrolling routes in anticipation of locating later emerging females. The marbled white *Melanargia galathea*, odd ones or twos which have been seen in recent years, was not seen, perhaps suggesting that past sightings were of deliberate unauthorized releases?

The fine summer weather produced a later generation of the small copper *Lycaena phlaeas*, particularly in the Western Plain area (I. Menzies) and the holly blue *Celastrina argiolus* appeared in reasonably good numbers for the second successive year. This perhaps in anticipation of another 'argiolus' year, of the type that dominated the early 1990s. Populations of this species tend to fluctuate

violently, often in cycles, corresponding with the populations of its host-specific larval parasite *Listrodomus nycthemerus*.

Beetles (Ian Menzies)

On 13 January examination of loose bark on poplars in Hundred Pound Wood revealed several hibernating *Dorytomus longimanus* (Forster), a light-brown-coloured weevil with (as the name suggests) extraordinarily long front legs and tarsi. Later on, however, the progress of spring was held back by a prolonged cold spell during May, with persistent NE winds resulting in a delay of some two or three weeks in the appearance of many species.

On 19 May hawthorn blossom was beginning to appear, and although the turnout of associated longicorn beetles was disappointing, activity of the attelabid leaf-rolling weevils *Rhynchites caeruleus* (Degeer) and *Caenorhinus aequatus* (Linn.) on hawthorn, *Apoderus coryli* (Linn.) and *Deporaus betulae* (Linn.) on hazel, and *Lasiorrhynchites cavifrons* Gyllenhal on oak, was evident. A single female of the very local leaf-roller *Byctiscus betulae* (Linn.) was discovered on a poplar in the Arboretum, but, unfortunately, there was still no sign of *Byctiscus populi* (Linn.) which has been absent for at least three years. Both are spectacular species, being brilliant green with gold and copper reflections: at Bookham both have generally been found on aspen. A few *Dorytomus tortrix* (Linn.) were also found on 19 May, associated with aspen and poplar in the Arboretum, but the same species was found in larger numbers on 26 May.

The tiny ladybird *Clitostethus arcuatus* (Rossi) was found again this year, on ivy growing around oak trunks by the side of Common Road, on 26 May (Martin Collier), and 8 June (Maxwell Barclay). Maxwell also found the longicorn beetles *Phymatodes alni* and *Judolia cerambyciformis* on 8 June. *P. alni* often colonizes fallen oak branches, and may be seen running actively along the twigs superficially resembling a wood ant, while *J. cerambyciformis* appears to be a wasp mimic and may be found on umbel, blackberry and thistle flowers. *Strangalia quadrifasciata* (Linn.), also a local but much more impressive longicorn wasp mimic, was seen on 6 July, visiting thistle, and again on 26 July visiting hogweed.

Of the phytophagous beetles *Chrysolina menthastri* (Suffrian) was seen on several occasions on the water mint growing by Isle of Wight and Lower Eastern Ponds, a single example on 8 June, but larger numbers, in company with *C. polita* (Linn.), on 13, 26 and 31 July and 26 August. *Phyllobrotica quadrimaculata* (Linn.) was found in very large numbers, demolishing the leaves of skullcap *Scutellaria galericulata* by the Lower Eastern Pond on 13, 26 and 31 July, a few still being present on 26 August. A few *Chrysolina brunsvicensis* (Grav.) were found on the flowering stems of square-stalked St John's wort *Hypericum tetrapterum* on 26 August and 12 October in the same area. Two of the very rare *Zeugophora flavicollis* (Marsham) were noted on aspen in the Arboretum on 31 July, and the very local flea beetle *Chalcoides nitidula* (Linn.) was also on aspen (and white poplar) in the Arboretum (19 May, 14 September). *Chaetocnema confusa* (Boheman) and *C. arida* Foudras, also notable flea-beetles, were swept from grassy areas on Eastern and Bayfield Plains respectively (31 July), and *Chalcoides plutus* (Latreille) was found on an old crack willow from the Central Plain (26 August, 14 September).

Other notable coleopterous species seen included *Mordella villosa* (Schrank), first found at Bookham near Bayfield Pond in 1995, was seen this year visiting angelica flowers in greater numbers distributed over a large area (31 July — Bayfield and Isle of Wight Plains and along Glade Path — Donald Prance and ISM). *Litargus connexus* (Fourcroy), apparently not previously recorded for Bookham, was also found by DP on this occasion. The rare jewel beetle *Agrilus sinuatus* (Olivier) was found by beating old hawthorns on the Central Plain, five by Roger Booth on 28 July and one by ISM on 26 August. The incidence of

characteristic D-shaped exit holes and dead hawthorn branches suggests that *A. sinuatus* is well established in this part of the Common.

On 28 July a single *Scopaeus laevigatus* (Scopoli) was found by Roger Booth running on mud at the margin of Bayfield Pond in the late afternoon. This exceedingly rare rove beetle is new to Bookham and possibly to Surrey. He also found *Meligethes gagathinus* Erichson by sweeping water mint near Bayfield Pond and, at West Hollows Pond, *Atheta basicornis* (Mulsant & Rey): both are notable species new to Bookham. The continued presence of *Carpelinus obesus* (Kiesenwetter) and *Gnypeta velata* (Erichson), recorded for the first time at Bookham in 1965 from the margin of West Hollows Pond, was also noted.

Bugs (Ian Menzies)

A pair of *Gonocerus acuteangulatus* (Goeze), the box bug, was obtained on 8 June from the same cultivated apple 'escape' near Merritt's Cottage mentioned in the 1995 Progress Report. The female subsequently laid several shiny cream-coloured eggs of an asymmetrical mango-like shape, either singly or in pairs, on hawthorn and apple leaves placed in a suitable container. The nymphs emerged in about two weeks and fed somewhat reluctantly by piercing soft fruits such as ripe cherries, but failed to reach maturity. On 26 July five more nymphs were found on the apple tree mentioned above, and on 14 September eight adults were found, mainly by beating hawthorn bushes on the Isle of Wight, Bayfield and Central Plains. In recent years the species has been regularly found outside the traditional 'Box Hill' area, not only at Bookham but also on Epsom and Ashted Commons, and appears to be well established in this area.

David Miller lists the following heteropterous bugs seen on 14 September 1996:

South Eastern Wood/Central Plain: *Acanthosomua haemorrhoidale* (Linn.), *Troilus luridus* (Fab.), *Rhopalus subrufus* (Gmelin), *Physatocheila dumetorum* (Herrich-Schaeffer), *Elasmotethus interstinctus* (Linn.), *Gonocerus acuteangulatus* (Goeze).

Bayfield Plain: *Himacerus apterus* (Fab.), *Coreus marginatus* (Linn.), *Dolycoris baccarum* (Linn.), *Eurydema oleraceum* (Linn.), *Aelia acuminata* (Linn.), *Phytocoris varipes* Boheman.

Isle of Wight Plain: *Kleidocerys resedae* (Panzer), *Anthocoris nemorum* (Linn.), *Pantilius tunicatus* (Fab.).

Bush-crickets (Ian Menzies)

Whereas the long-winged conehead *Cryptocephalus discolor* (Thunberg) continues to spread its range on the Common, that of the short-winged conehead *C. dorsalis* (Latreille) has become even more restricted than it was in 1995. On 10 August *C. discolor* was present in numbers on most grassy areas of Central, Bayfield, Isle of Wight and Western Plains, but only two *C. dorsalis* could be found, restricted to a small area at the northern end of the Western Plain. The distribution of Roesel's bush-cricket *Metrioptera roeselii* (Hagenbach) appears to have retracted, being absent this year from the Western Plain and detected mainly in the eastern half of Bayfield Plain. A further survey on 14 September failed to detect *M. roeselii* on the Isle of Wight, Bayfield or Central Plains where it was present in 1995, but the species was stridulating together with *C. discolor* within a stone's throw of Merritt's Cottage.

On the Bush-cricket Study Day (17 August) the above distribution of *C. discolor*, *C. dorsalis* and *M. roeselii* was confirmed. In addition several of the fully-winged pale-green oak bush-cricket *Meconema thalassinum* (De Geer) were found by beating leafy branches such as oak, and the apterous speckled bush-cricket *Leptophyes punctatissima* (Bosc.) was seen several times at rest on

the lower vegetation. Stridulating colonies of the apterous 'dusky bush-cricket' *Pholidoptera griseoptera* (De Geer), were located with the aid of a bat-detector, or an acute youthful ear! This surprisingly large insect was found along the partly shaded west margin of the Western Plain path.

The day was concluded by a visit to Wisley Common, an area of acid heath where the bog bush-cricket *Metrioptera brachyptera* (Linn.) was abundant amongst the heather, and both adults and tiny nymphs of the wood-cricket *Nemobius sylvestris* (Bosc.) were to be found running amongst the dry leaves and over bare and moss-covered ground along the partly shaded wood margins. As at Bookham, *C. discolor* was found to be abundant in the grassy areas, but only a single *M. roeselii* was detected. In all, our party of nine enthusiasts managed to observe eight of the fourteen 'regular' species of British crickets during the course of the day!

The divisions of Bookham Common (Bryan Radcliffe)

Shortly after the commencement of the Bookham Survey (some fifty-four years ago) it was decided that recording work would be facilitated if the survey area was divided into a number of portions, and this was carried out. The number selected was twenty and these were differentiated by letters in the series A–T. In due course they became known as 'divisions'.

The natural wish to achieve uniformity in size of divisions was clearly unattainable. Firstly, the Common was markedly irregular in shape. Secondly, a boundary line drawn on a map, while being reasonably simple to follow in open grassland, would become difficult in scrub and virtually impossible in woodland. It was necessary therefore to adopt boundaries based on permanently recognizable features such as paths, ditches and streams. Since these were not uniformly distributed over the terrain the unavoidable consequence was a wide variation in size and shape of the divisions. The area occupied by a division was unknown.

This less-than-ideal solution has been in operation for a long time. It has enabled much useful work to be done, and it would be quite wrong to abandon it now. However, recent interest in the distribution and migration of plant species has prompted the wish to define the divisions in a more quantitative manner. An attempt has therefore been made to determine, to an acceptable degree of accuracy, their areas and centres. The purpose of this note is to place on record the data obtained, for the benefit of future workers in any discipline. A brief outline of the techniques adopted may also be of interest.

Areas

The starting point was the base map; this being the 1972 revision prepared by H. A. Sandford, scale 1:6,336. A copy was cut with great care into portions following the divisional boundaries. The portions were then weighed on a sensitive balance to an accuracy of 0.1 milligram. A square piece of the same sheet was cut to represent 400×400 metres and similarly weighed. Comparison of the weights enabled simple calculation of the areas of individual divisions.

Weighing to 0.1 mg represents a potential error of 0.03 acre, but the indeterminate error possible from inaccurate mapping or cutting should be allowed for. In view of this, areas are quoted to one decimal place only.

Centres of Divisions

The same divisional shapes were stuck on an acetate sheet of uniform thickness (checked by micrometer) and the sheet was cut with great care to match each paper shape. A tiny piece of clear adhesive tape was attached to a projecting corner and used to suspend the assembly from the point of a needle. The needle point was applied to a vertical line ruled on a vertical surface and

the assembly allowed to swing freely. When at rest the point on the lower edge of the assembly coincident with the line was marked. A straight line was drawn to connect the mark and the needle hole. The tape was moved to other corners in turn and the procedure repeated, producing a series of intersecting lines. It was found that this provided an accurately defined point intersect.

The centre determined in this manner was actually the centre of gravity of the assembly, but owing to the uniform relationship of weight to surface area it qualified equally as the centre of area of the division. Superimposition on another copy of the map enabled the co-ordinates (i.e., the grid reference) to be determined.

The scale of the map was such that measurements on it could have been made representing as little as four metres on the ground. As before, however, to allow for indeterminate errors of mapping or cutting, the co-ordinates are quoted to four figures only (to ten metres, east-west, north-south.). Areas and map references of the centres are shown in Table 1.

TABLE 1. The divisions of Brookham Common with areas and map references.

Division	AREAS		CENTRES OF DIVISIONS	
	Hectares	Acres	Eastings	Northings
A	8.5	21.0	1270	5690
B	8.2	20.3	1298	5696
C	7.1	17.6	1324	5693
D	10.0	24.6	1225	5661
E	8.3	20.4	1247	5657
F	8.1	20.1	1263	5655
G	8.6	21.3	1286	5661
H	6.6	16.2	1306	5656
I	9.0	22.2	1325	5653
J	7.2	17.7	1340	5660
K	5.3	13.1	1277	5635
L	3.7	9.2	1308	5633
M	7.3	18.0	1306	5602
N	5.0	12.4	1290	5624
O	8.5	21.0	1205	5651
P	5.8	14.4	1227	5625
Q	8.7	21.4	1232	5599
R	11.8	29.2	1258	5579
S	8.1	20.1	1276	5590
T	8.4	20.7	1283	5607
Isle of Wight enclosure	2.5	6.2		

All locations are in 100 km square TQ and combinations of the above pairs give the National Grid reference of each centre.

In *Newsletter* 129 of February 1995 our President drew attention to an equation proposed by Arrhenius in 1923 that attempted to allow calculation of the number of species (either of plants or animals) to be expected in areas of various sizes. It can be written, alternatively:

$$N = kA^x \qquad \text{or} \qquad x \log A = \log(N/k)$$

where N is the number of species occupying an area of dimension A, while k and x are linear and exponential constants applying to a particular habitat. The constant x would be expected to have a value of less than unity, and it is understood that several studies have suggested that it would commonly lie in the region of 0.2–0.35.

Having obtained reliable values for divisional areas at Bookham, and with the extensive data of the last major survey to hand, the above equation was tested to see if credible values for the constants could be derived. Unfortunately,

although a few lay within the limits mentioned above, the majority diverged very widely. Inconsistency was least when comparing the more-open areas, and the five possible combinations gave values of x between 0.34 and 0.7. Nevertheless, considering the whole spectrum of calculations across all divisions the variation was enormous from 0.06–192.

These unsatisfactory results should not be interpreted as evidence that the equation was invalid, but rather that the areas studied were too variable in character to permit mathematical comparison of this type. The probability is that the equation can only be applied to areas sharing an essentially uniform habitat. Thus, anything contributing to habitat discontinuity, such as major paths, ponds, watercourses, horse rides, car parks, etc., would negate proper comparison. Variations in natural features, such as soil types, drainage and slope would no doubt be significant.

No pair of divisions of the Common exists that share these complications equally, so quantitative comparison is not possible at this time. However, within divisions (and away from their boundaries) there are a few fairly substantial blocks of apparently homogeneous terrain. In the coming season it is proposed to study these in detail, recording species content in single and multiple areas. It is hoped to find areas of sufficient size to allow for a meaningful test of the Arrhenius equation.

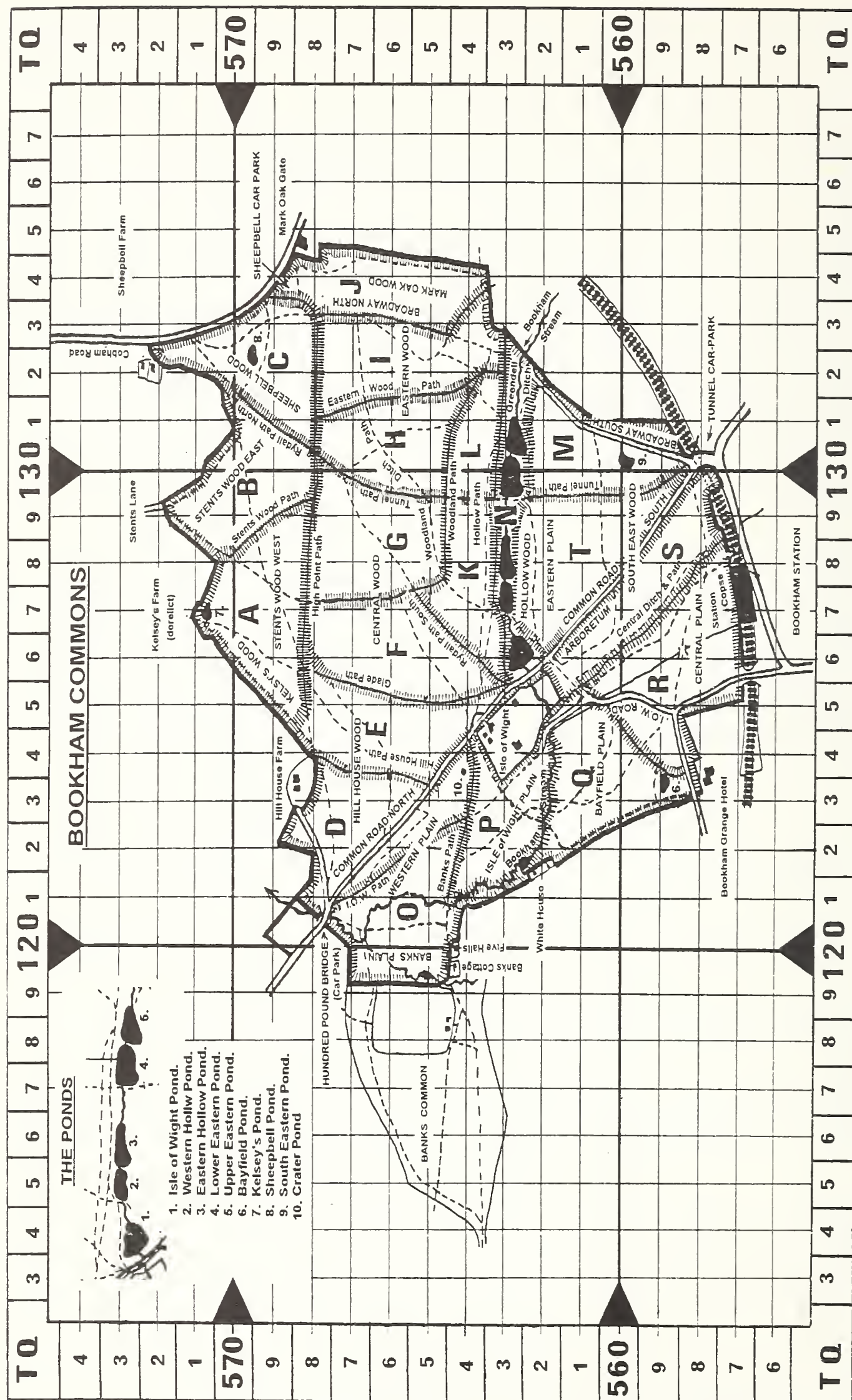
Record card and map (Ian Menzies)

A specific record card for Bookham Common has now been produced (Figure 3). Spaces are allocated for species' and recorders' names, location, date, and other comments (incidence, etc.) to emphasize the importance of submitting information that goes on beyond a mere listing of the species seen.

A map of Bookham Common naming paths, roads, woods and plains (Figure 4) is printed on the reverse of the record card. Established divisions (discussed above) are outlined and National Grid 100-metre intervals superimposed to

BOOKHAM COMMON RECORD CARD			
GENUS/SPECIES	LOCATION and COMMENTS (ecology, frequency, time etc.)	DATE	Recorder/Determinator

FIGURE 3. Bookham Common record card, shown here in reduced size.



facilitate determination of six-figure map references when appropriate. However, a simple method of using the card is to draw consecutively numbered pencil rings on the map which correspond to each entry.

The record card is intended to be suitable for use by those studying any class of flora or fauna. Provided observations are entered and returned to the study-group organizers, these cards should provide a useful basis for the retention and subsequent retrieval of significant data.

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FIGURE 4. Map of Bookham Common, showing divisions, paths, roads, woods, plains and ponds. This map is printed on the reverse of the record card.

Book reviews

Animals under logs and stones. C. Philip Wheater and Helen J. Read. Naturalists' Handbooks 22. Richmond Publishing Co., Slough. 1996. 90 pp. £15 hardback, ISBN 0 85546 302 3; £8.95 paperback, ISBN 0 85546 301 5. Additionally, a separate, concertina-folded and laminated glazed wallcard, which duplicates the four coloured plates from the book and also incorporates two useful tabular keys, is available for £1.75.

Ants. Gary J. Skinner and Geoffrey W. Allen. Naturalists' Handbooks 24. Richmond Publishing Co., Slough. 1996. 83 pp. £15 hardback, ISBN 0 85546 306 6; £8.95 paperback, ISBN 0 85546 305 8.

We have here two worthy additions to the Naturalists' Handbooks series; long may it continue! The two under review are of particular interest to the writer, because an interest has recently developed in ants, and invertebrates under 'logs and stones' (I wonder why other material, such as old carpets, was omitted?) have long been a fascination.

A study of these two books has provided a great deal of interesting information, the colour plates are well produced and the keys seem very workable. A pity then that one or two minor criticisms arise. With no experience in cultivating ant colonies, the descriptions of the formicaria (Figs 25 and 26) were felt to be too vague to allow of visualization; an artist's drawing in place of a two-dimensional sketch would probably have removed the problem.

In *Animals under logs and stones*, page 2 *Pterostichus madidus* is classified on page 3, not underneath on page 2! On page 33, step 5 of the classification could well have carried an explanation of 'striations', not necessarily understood by all readers. An arrow indicating teeth of the snail shell ought to have been included, especially at illustration III-7; unless the reader is aware that the teeth are not as with those of mammals, i.e., used for biting or grinding, the term might be confusing. On page 38, key step 48, the term 'mantle marbled' has been used in both first and second lines; only once is needed.

These points should not be allowed to detract from two useful and most welcome volumes in the series which should prove of immense interest to any naturalists, budding or experienced.

As with other volumes in this series, the keys will assist in classification, often to specific level, and if the references are used, identification should be possible for all animals from the various aids listed. The biology is extremely interesting, and any ecological student could well find it stimulating, especially in the suggestions for further studies. Information on collection, extraction, marking, preservation of material, keeping specimens alive for study, and writing up one's results, is lucid and helpful.

In *Ants*, a comment has been made by a colleague that the line drawings of the scapes could have been improved, and thus assisted in the provision of better keys, such as illustrated in *Fauna Entomologica Scandinavica* vol.8 (Formicidae) by C. A. Collingwood, which is published in English.

However, this writer will be purchasing both volumes reviewed, and has no hesitation in commending them for use by anyone interested in these groups. They are valuable additions to any library.

KEN HILL

We have also received Naturalists' Handbooks 25, *Thrips*, by William D. J. Kirk. Ed.

The Hampstead Heath Survey: a long-term look at the Heath by the London Natural History Society

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In 1942 the London Natural History Society started to survey the wildlife of Bookham Common in Surrey, an area owned by The National Trust. Over fifty years later this survey is still going strong and is the longest-running survey of its kind in Britain (probably in Europe). To start such a project at the height of the Second World War showed great optimism for the future; optimism which has been more than justified by the results.

A huge amount of information and data has been gathered and published. One of the advantages of an organization like the LNHS carrying out such a survey is that no one is paid to do it. It is done for interest and fun, and can therefore keep going as long as the members find it interesting and fun. Some of the results from the Bookham Survey, such as the ups and downs over eighteen years in the numbers of nesting birds in a piece of woodland on the Common, are much quoted.

Our Bookham Common Survey is a south-of-the-Thames success story, and, as mentioned in the last *London Naturalist*, a similar survey was started in the middle of 1996 on Hampstead Heath. Regular meetings on the last Saturday in the month commenced in July. They have been supported by 12–18 members attending, with individuals also recording at other times.

With the Heath covering about 800 acres (324 hectares) it was a little difficult to decide on what, and where, to start. It is all too easy to rush into recording only to realize later that it should have been done a different way. Jeremy Wright has spent much time and effort in establishing a usable set of maps so that distributions can be plotted with reasonable precision. This is most important for monitoring changes. The Habitat Handbook No. 1, *Hampstead Heath flora*, published by the former GLC in 1986, was incomplete and had some inaccuracies. As a start, we therefore decided to update a selection of the more significant plant species. Surveys of the service-tree, Japanese knotweed, gorse and broom have been completed.

Ray Softly pointed out some years ago that the moles on the Heath are presumably an isolated population. As such they must be at risk from extinction. We have completed a first survey and found only one small group of molehills north of the Spaniards Road. Are roads a barrier to movement? Monitoring the moles for changes in population and movements will continue.

Jane Reynolds, the Society's recorder for molluscs, has been working on the slugs and snails. To date (April 1997) she has found about thirty species. Not a bad start for an acid area.

Other animals and plants have also been recorded on a less-systematic basis. Some of these have been rather interesting, such as the infrequently seen toadstool, *Stropharia aurantiaca* (Figure 1), found on the horse-ride on the Heath Extension. It was apparently associated with the wood-chipping surface.

The Heath has attracted many naturalists over the years. There are botanical records going back to at least the sixteenth century. Since starting we have both found, and been told about, records and surveys by both commissioned professionals and individuals for interest and fun. One of our long-term aims is to catalogue this. It will form an invaluable source against which to compare our current findings. This independent recording continues. For instance, Mr John Maxwell has produced a Hampstead Heath butterfly report for 1996.



FIGURE 1. *Stropharia aurantiaca*, an infrequently seen toadstool, recorded on our survey day, 26 October 1996.

Photo: Barbara Villiers

Twenty-three species were recorded, including breeding colonies of white-letter hairstreaks. He records that on 16 June, whilst watching brimstone larvae on buckthorn, a female butterfly arrived and laid eggs. Thus he had three life-phases of this single-generation butterfly together. A remarkable observation!

The Heath attracts bird-watchers and their records have appeared in annual reports for many years edited by Kate Springett and latterly by Mark Hardwick. This will complement the transect recording and regular monthly bird counts that have been organized by John Barrington as part of our Survey. I have also been presented with a tree survey carried out in the 1970s by Mr David Sullivan. It is not the intention of the Survey to supplant any recording that is going on, but to encourage it. The Heath is a large area and needs all the recorders it can get. What we want to do is gradually to bring all the records together and to fill in the gaps (which will be large since there is a mighty lot of smaller wildlife, such as beetles, and flies, and fungi, and worms, and ...).

Botanical records for 1996

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Abstract

New county records, or first records after a long interval, include *Leucojum aestivum* and *Conyza bilbaoana* in Surrey, *Festuca lemanii* in Essex, *Persicaria capitata* in Herts., *Geum rivale* in Middlesex and *Rumex palustris* and *Ranunculus sardous* in Bucks. *Lepidium latifolium*, *Geranium rotundifolium* and *Stellaria pallida* are all apparently increasing in the London Area.

Introduction

In my publication of 1995 botanical records from the London Area, defined as a circle of radius 32 km centred on St Paul's Cathedral (Burton 1996b), I said it was now possible to produce these compilations by selecting from a computer output of all the previous year's records, ready sorted into the sequence of the text below, which divides the records according to vice-counties as defined by Watson (1873), to London boroughs as currently bounded, and to persons. This procedure is not without its disadvantages, of which three have occurred to me so far. 1 Exciting discoveries which I do not get to hear about soon enough may never be published. In 1997 I have waited as long as I dared (until mid April) before printing off an output of 1996 records which can be worked on away from the computer. I have to leave time after that for preparing the paper and submitting it without delaying the editor's own procedures. 2 Some records received (e.g., Mr Kent's assurances that rusty-back fern *Ceterach officinarum* is still in Perivale churchyard) are vague as to the effective date. This can be circumvented by putting the last possible year and adding a note, e.g., 'Or a year or two earlier'. 3 The procedure does not distinguish between new discoveries and confirmation of earlier records. If it is known that a record confirms an earlier one, this too can be stated in a note, but confirmation can also be accidental. When all records were kept manually, it was easy to scan existing records of a rare species to see if there were previous records from the same place. No other advantage of the manual system comes to mind.

Many of the 1996 records received were made in the course of data collection for the Botanical Society of the British Isles's Atlas 2000 project. The aim of this project is to produce a publication in that year which will replace the *Atlas of the British flora* (Perring and Walters 1962), which mapped species in all of the British Isles according to their presence in squares of 10 × 10 kilometres; records from before 1930 were shown with a separate symbol, and for some species native and non-native occurrences were also distinguished by symbols. In the new publication records are to be in three date classes, pre-1970, 1970–1986 and 1987 onward, and recorders are invited to divide non-native occurrences between several categories ranging from 'casual' to 'planted'. I have to assemble data from seventeen 10-km squares, about half our recording area, and many members have responded enthusiastically to appeals for assistance with fieldwork. It is some years now since 1987 and many records that can be treated as current already exist in the manual records. During 1996 all the cards were scanned for records from our seventeen squares; further historical records have still to be extracted from printed sources. These efforts have made it possible to supply volunteers with lists of species already recorded since 1987 from their squares, and lists of 1970–1986 records which it might be possible for them to update. To round off this activity, there will be lists of very common species for which current records from a square are wanting.

V.C. 16, West Kent

Most of the records from Lewisham thrown up by the computer are the result of John Archer's works surveying the 'Kent' part of the square TQ37 for the Atlas 2000 project. I am particularly intrigued by his report of two small clumps of dwarf gorse *Ulex minor* in Beckenham Place Park. This has been well searched many times, but there are no old records. Can it possibly be a fairly recent planting? Bird-sown Asian firethorn *Pyracantha rogersiana* was at Sydenham Tennis Club, and at the other end of the borough fig *Ficus carica* and garden angelica *Angelica archangelica* are naturalized on the wall of the tidal Deptford Creek. Nearby Nick Bertrand found *Ceterach officinarum* at the parish church, a remarkable discovery. A small part of v.c. 16 containing Honor Oak Crematorium is now in Southwark, and here Mathew Frith found Midland hawthorn *Crataegus laevigata* on the side of allotments in the line of an ancient hedge. From Greenwich in 1996 I have only my own unremarkable records made from a train passing through. I was on my way into Bexley for an unsuccessful search for relics of the soybean aliens which were once a feature of the area surrounding an oil-milling works near Erith (Palmer 1977); the botanical evidence is that rape *Brassica napus* subsp. *oleifera* is the only oilseed processed there now. Also in Bexley, John Palmer's record of *Parthenocissus henryi* on the wall enclosing Bigs Hill Wood, Crayford has already been published in *BSBI News* 74: 42, whereas his report (Palmer 1997) of having seen seedlings of pampas grass *Cortaderia selloana* on stony waste ground behind Crayford Town Hall over several years was in *Bull. Kent Fld Club* 42: 46; the docks found by Geoffrey Kitchener included an unusual hybrid *Rumex conglomeratus* \times *palustris* with the parents in a cow-trod on Erith Marshes; and the rue-leaved saxifrage *Saxifraga tridactylites* seen in 1995 by David Nicolle near Bexley Station turned out to be an outlier of a very substantial population between the live rails. From Bromley, I endeavoured to make up for the shortage of Atlas 2000 records from the square TQ36 by spending an hour in High Broom Wood at the very edge of the vice-county; this site was well-known before 1987 and although entirely surrounded by housing, still supports many nice plants, such as marsh marigold *Caltha palustris*, soft shield-fern *Polystichum setiferum*, golden-saxifrage *Chrysosplenium oppositifolium*, moschatel *Adoxa moschatellina* and alder buckthorn *Frangula alnus*. Land near Hewitts Golf Course, Chelsfield has recently become a nature reserve, and from it Jean and Roy Aley report no less than eighteen stands of dark mullein *Verbascum nigrum*, a rare plant in this part (and most others) of our area; this record is taken from the thirty-seventh annual report of the Orpington Field Club, page 21, where Joyce Pitt mentions the same species from High Elms, together with white mullein *V. lychnitis* and the hybrid between the two.

The previous paragraph relates to that part of Watson's (1873) vice-county West Kent which is in London boroughs, starting with the inner boroughs. Following my usual practice, I now proceed to the remainder of the vice-county in our area, which is a circle extending 32 km from St Paul's Cathedral. Our joint meeting with the Kent Field Club on 8 September has been fully reported in our *Newsletter* and in the KFC's *Bulletin*; it started at Farningham Road Station (common calamint *Clinopodium adscendens*), spent some time on the nearer of the two Green Street Greens which is heavily mown and grazed, and finished the day at Beacon Wood Country Park near Bean. With Geoffrey Kitchener as leader it is not surprising that hybrids in the genera *Epilobium* and *Rumex* were found, but the Country Park, which is more than 3 km from tidal water, also had sea rush *Juncus maritimus* and sea club-rush *Bolboschoenus maritimus*, as well as narrow-leaved water-plantain *Alisma lanceolatum*, round-leaved wintergreen *Pyrola rotundifolia* and an enormous clump of butcher's-broom *Ruscus aculeatus*. Mr Kitchener's other records include hairy garlic *Allium subhirsutum* from a sandy mound at the edge of Ladies Wood, and

Neapolitan garlic *A. neapolitanum* at the edge of Green Street Green, both perhaps garden rejects though neither is at all common in gardens. Mr. Palmer has recently been publishing many of his records in *BSBI News*, concentrating on those which supplement in some way the information given by Clement and Foster (1994); there are also 'Interesting Kent plant records' in the *Bulletin of the Kent Field Club* (Palmer 1997) which include garden honeysuckle *Lonicera* \times *italica* scrambling on a railway bank at Dartford, sea aster *Aster tripolium* on unused ground at Wilmington, not near a road and three miles from the Thames Estuary, and dittander *Lepidium latifolium* in five localities in the Dartford area. Evidence of its increase in other counties will be mentioned below. Another plant reported from new localities in many counties in 1996 is lesser chickweed *Stellaria pallida* which I saw in the grass by Lullingstone Roman Villa. Also taken from the annual report of the Orpington Field Club is Sylvia Priestley's large colony of corn marigold *Chrysanthemum segetum* in a field of flax near Brasted; this might be the same sandy field where it was seen plentifully in 1955 by Francis Rose and Joan and Peter Hall, and again in 1966 by Miss M. Wells.

V.C. 17, Surrey

A tree found by Mathew Frith in a possible old hedge-line in the Borough of Southwark has already been mentioned under v.c. 16; in another place only about 400 yards away but in Watsonian Surrey, he found wild service-tree *Sorbus torminalis*. In the same borough, the reference to *Parthenocissus henryi* found in Kent mentioned the same plant under London Bridge Station. Somewhere by the railway tracks out of this station Cameron Crook saw a foxglove-tree *Paulownia tomentosa* from a train, but it is impossible to localize this record adequately and it might even be in another borough. The best plant from my own half day in Southwark was a large plant of cut-leaved dead-nettle *Lamium hybridum* at the corner of Pottery Street and Cherry Garden Street. From Lambeth, Richard Fitter sent me a hawkweed specimen from near Lambeth Palace which I determined as *Hieracium scotosticum*; this species has previously been a weed in the Tradescant Garden nearby. Tony Hare's brief list from a tiny patch of grassland near his home in Bedford Road includes the less common subsp. *hederifolia* of ivy-leaved speedwell *Veronica hederifolia* and field madder *Sherardia arvensis*. Of the inner Surrey boroughs, Wandsworth had by far the most numerous 1996 records. Elizabeth Norman sent me long lists from Battersea Park, Tooting Bec Common and Wandsworth Common; whilst it is easy to assume that many of the native plants in these were deliberate introductions, e.g., the greater spearwort *Ranunculus lingua* in a very small pond in Battersea Park or the viper's bugloss *Echium vulgare* and corncockle *Agrostemma githago* near a pond on Tooting Bec Common, it is harder to know what to make of the lesser hawkbit *Leontodon saxatilis* in a meadow in Battersea Park or the alder buckthorn *Frangula alnus* of fair age on Wandsworth Common. Certainly the latter has a reasonably wild area east of Trinity Road overlooking a pond, where the thin grassland has early hair-grass *Aira praecox* and *Stellaria pallida*. By far the most rewarding site in Wandsworth in 1996, however, was Gargoyle Wharf, immediately east of Wandsworth Bridge, which had once been a gin distillery, then was vacant for several years until it was occupied by a collective squat organized by a body called The Land Is Ours. This established homes which were occupied until the eviction of the temporary residents after several months, carried out on behalf of the owners of the land, the Guinness Company, whose plans for a supermarket there have been rejected. I had better not say who the three people were whose trespassing resulted in a most impressive plant list (their names all appear somewhere on these pages), but one of them invited me there on 25 June and I was able to add a few names to the list. The more striking plants there were those which persist

from cultivation such as day-lily *Hemerocallis fulva* and shrubby scorpion-vetch *Coronilla valentina* subsp. *glauca*; these were on the foundations of buildings which can be identified on old aerial photographs, rather than the spaces between them, and must therefore be considered naturalized. Some unusual native plants were also present, such as shining cranesbill *Geranium lucidum*, fern-grass *Catapodium rigidum* and soft clover *Trifolium striatum*; the last of these was apparently introduced with sand.

In v.c. 17, Merton and Richmond upon Thames have an intermediate position between the inner and outer London boroughs. In Merton, Dave Dawson and Nick Bertrand found a single plant of pyramidal orchid *Anacamptis pyramidalis*, but its locality is not for publication. At the London Wildlife Trust visit on 1 May to the well-known New Battersea Cemetery at Morden Park, Dr Dawson pointed out a natural primrose-cowslip hybrid *Primula* \times *polyantha*; creeping jenny *Lysimachia nummularia* might be thought of as an introduced plant in the cemetery, but it was also seen outside the cemetery fence in the more natural habitat of the meadow by the Pyl Brook. There are many records from Richmond, because we had meetings there on 4 May, 24 June and jointly with the BSBI on 20 July, the last visiting sites in v.c. 21 as well; however with centuries of active botanizing from staff and visitors to Kew Gardens there is little likelihood of many of these being novelties. The May meetings saw many of the known plants of Kew Green, including the diminutive blinks *Montia fontana*, but the report does not mention *Stellaria pallida* which I saw there in quantity on an earlier date, nicely contrasted with the similar but much larger chickweed *Stellaria media*. Paul Bartlett also observed *Stellaria pallida*, as well as cotton thistle *Onopordon acanthium* on Richmond Golf Course and other plants in the course of Atlas 2000 recording. The thistle was also seen in the borough by Neil Anderson, on the Thames path west of Hammersmith Bridge. The June meeting observed several large clumps of knotted bur-parsley *Torilis nodosa* in what is one of its few remaining Surrey localities on Petersham Meadows. The July meeting found only a shrivelled lump where there used to be naturalized limestone fern *Gymnocarpium robertianum* on Kew Gardens Station; established Peruvian lily *Alstroemeria aurea* is not a satisfactory substitute. Mrs Norman found a few plants of the hybrid water-speedwell *Veronica* \times *lackschewitzii* on the towpath near Richmond Bridge, where both the parent species occur; this is the first Surrey record of the hybrid since 1884. Keith Bosher's records of keeled garlic *Allium carinatum* and sand leek *A. scorodoprasum* have already appeared in the Surrey Flora Committee Newsletter.

I will deal with the outer London boroughs in v.c. 17 clockwise. Croydon was resurveyed by the London Ecology Unit in 1996; Mike Mullin found 'the native form' of heath pearlwort *Sagina subulata* amongst the normal *S. procumbens* in Trumble Gardens, Thornton Heath, which is hardly likely to be a native locality whether or not a native form can be distinguished, and *Saxifraga tridactylites* at East Croydon Station. As part of the Atlas 2000 effort, Graham Medcalf confirmed that Austrian yellow-cress *Rorippa austriaca* is still on the railway embankment alongside Sussex Road, South Croydon. In October Phil Pope took me over two lengths of disused railway at Addiscombe, part of the course of a projected light railway link to New Addington for which his company is preparing the environmental impact assessment; although we did not find limestone woundwort *Stachys alpina* which has been reported from here, undoubtedly in error, there were splendid displays of fruiting firethorn *Pyracantha coccinea* and Virginia creeper *Parthenocissus quinquefolia*, an eight-foot sapling of large-leaved lime *Tilia platyphyllos* and just a few uncommon native species. The only record from Sutton this year is Mr Mullin's duck-potato *Sagittaria latifolia* in the River Wandle at Hackbridge. From Kingston upon Thames, John Hodge told me of a much increased patch of Hungarian brome *Bromopsis inermis* on waste ground near Berrylands Station, which makes a 1975 record of the annual species rescue brome *Ceratochloa cathartica* look

more likely to be an error, and of abundant strawberry clover *Trifolium fragiferum* in an old meadow near the Hogsmill River.

In that part of v.c. 17 which is still Surrey, first mention is due to Barry Phillips, who has dealt very thoroughly with the square TQ06 for Atlas 2000. His most remarkable discovery in 1996 was surely the plant of summer snowflake *Leucojum aestivum* among the trunks of a willow at the edge of the Thames below the level of Chertsey Meads. This is absolutely the right habitat for the native plant still occurring in reasonable quantity upstream in Berkshire, but believed extinct in Surrey and the London Area. In the Rive Ditch, Barry found another great rarity, needle spike-rush *Eleocharis acicularis*, and he managed to get to Whiteley Village in the far corner of the square from his home where the relict native plants include marsh pennywort *Hydrocotyle vulgaris*, lesser skullcap *Scutellaria minor* and bulbous rush *Juncus bulbosus*, but lily-of-the-valley *Convallaria majalis* is regarded as a garden escape. His *Stellaria pallida* was on Ferry Lane, Chertsey. He also covered the small part of TQ07 in Surrey, and with Joyce Smith found two unusual *Persicaria* hybrids by Langham Pond, Runnymede, *P. maculosa* \times *hydropiper* = *P. \times intercedens*, and *P. maculosa* \times *mitis* = *P. \times condensata*. On one memorable day, he and Mrs Smith met Francis Rose, David Bevan, Tony Hare and myself, who had foregathered in Middlesex, in order to look at downy-fruited sedge *Carex filiformis* which he had rediscovered two years earlier after a long interval at Thorpe Hay-Meadow; on the way we observed a population of *Lepidium latifolium* near a fishing lake, which although a recent arrival already numbered over twenty plants. I was sorry to miss the September meeting of the Surrey Flora Committee which Mrs Smith runs, studying the roses of Bookham Common, which it transpired include round-leaved dog-rose *Rosa obtusifolia*, short-styled field-rose *R. stylosa*, and even an extensive colony of the hybrid between the latter and field-rose *R. arvensis*, which is called *R. \times pseudorusticana*. From her 1996 *Newsletter*, I learn that John Dicker found about twenty plants of corn caraway *Petroselinum segetum* in Leatherhead churchyard; this is very much rarer in Surrey than it is in Kent. From the same source, John Hodge found naturalized *Conyza bilbaoana* in two places just in our area near Cobham; this species, which may have been overlooked elsewhere because of its similarity to Canadian fleabane *C. canadensis* (indeed some authorities refuse to accept it as distinct), was only recently reported as a British plant (Stanley 1996). Eileen Taylor showed me a specimen of catmint *Nepeta cataria* which she had found between the paving stones of Epsom High Street.

V.C. 18, South Essex

The only 1996 records I have from Barking & Dagenham and Havering are observations from cars of Danish scurvy-grass *Cochlearia danica*, already reported last year (Burton 1996a). From Newham, Peter Tymkov reported *Lepidium latifolium* coming up through new tarmac on the former BR platform at Upton Park Station, and at Manor Park Station I saw *Ceterach officinarum*, polypody *Polypodium vulgare* and hartstongue fern *Phyllitis scolopendrium* through the grating of the drain of platform 2/3; I was disappointed to learn that these are known here already. We have many records from Redbridge because of the notes I made at our meeting on 27 July; most of these confirm the existing observations from Wanstead Park by Paul Ferris (1980) who jointly led the meeting, but he had only recently discovered buttonweed *Cotula coronopifolia* by the River Roding east of the Park, and had perhaps not appreciated that many of the water-plantains by Heronry Pond are the hybrid *Alisma* \times *rhizocarpum*. Interesting new arrivals in the area noted were the less common subspecies *wirtgenii* of common fumitory *Fumaria officinalis*, evidently introduced with planted shrubs in two places in the Park, and confused fescue

Festuca lemanii growing on gravel brought in to cover the site of the former adjacent sewage farm.

Our meeting of 27 April was in that part of Epping Forest which is still in Essex, but that was to look at bryophytes, which are outside the scope of this report. However it was an opportunity to examine the foliage of floating pennywort *Hydrocotyle ranunculoides* which is pestilential on Goldings Hill Pond.

V.C. 19, North Essex

Later we were able to compare them with the leaves of the native *Hydrocotyle vulgaris* in the north Lodge Road bog, which is just across the vice-county boundary.

V.C. 20, Herts.

Diana Griffith sent me a few notes from part of v.c. 20 which is now part of the London Borough of Barnet. Where she had already recorded the hybrid *Hypericum* \times *desetangsii* (Burton 1996b) there was also its parent imperforate St John's-wort *H. maculatum*, also determined by N. K. B. Robson. Marsh speedwell *Veronica scutellata* appeared on the bank of the pond at Rowley Green Nature Reserve, not one of its original localities. Sneezewort *Achillea ptarmica* is commonly thought of as a desirable wild flower, but in the Dollis Valley east of Horseshoe Lane a huge spread of it is overwhelming ragged robin *Lychnis flos-cuculi*.

Our meetings of 25 May and 17 August, over the same ground, were entirely in Hertfordshire proper, though they did begin along the vice-county boundary. In Hawkshead Wood it was evident in May, less so in August, that the commonest birch is the hybrid *Betula* \times *aurata*. The May meeting found a single small plant of great wood-rush *Luzula sylvatica* which had disappeared by August and was perhaps planted anyway. At the August meeting Noreen Sherlock found a plant of stinking chamomile *Anthemis cotula*, a rare field weed nowadays, and both meetings had *Hypericum maculatum* as the commonest St John's-wort. As usual there is a long list of records from Ann Boucher, her last as she has now moved away from the area. There are four different main road localities for reflexed salt-marsh grass *Puccinellia distans*, including a 'solid' two-mile stretch of the M25 west of the M1 junction, and nine verges with *Stellaria pallida*. This species has already been mentioned under Kent and Surrey, and will be mentioned again under Middlesex. I am not sure whether it had a sudden increase in 1996, or had simply been overlooked before. Certainly Mrs Boucher had recorded it occasionally in previous years. It inhabits poorer sites than the common chickweed, often where annual meadow-grass *Poa annua* is the only other species present, and needs to be looked for in spring when it is most abundant. Amongst the alien species in her records, I will single out *Persicaria capitata* in pavement cracks outside the King George IV public house at Great Amwell and box-leaved honeysuckle *Lonicera pileata* in the gutter of a Welwyn Garden City car park. Ian Johnson found seven plants of thorn-apple *Datura stramonium* on a South Oxhey building site.

V.C. 21, Middlesex

I will divide v.-c. 21 into four zones all considered clockwise, the City of Westminster and boroughs adjacent to the City of London (from which there are no 1996 records worth mentioning); other boroughs not on the outer margin of the vice-county; remaining London boroughs; parts of the vice-county outside London boroughs. My own records of *Stellaria pallida* are certainly the most central, for I found quite large quantities of it near Westminster Abbey and in the north-east part of St James's Park. It was also in the 1995 records from Buckingham Palace, the list from which has had several 1996

additions by Elinor Wiltshire and/or David McClintock, including a small patch of spotted medick *Medicago arabica* which has similar habitat preferences to the *Stellaria*, a quantity of silver hair-grass *Aira caryophyllea* in the form sometimes accepted as subspecies *multiculmis*, and a long-established population of yellow garlic *Allium moly*. Mrs Wiltshire also passed on to me the head gardener Mark Lane's reports of ramsons *Allium ursinum* and ivy-leaved crowfoot *Ranunculus hederaceus* in the Palace grounds, both of them obviously not native. John Palmer found a plant of throatwort *Trachelium caeruleum* on a stone doorstep in Eaton Square. Dorothy Brookman saw a solitary cowslip *Primula veris* in the Embankment Gardens, which cannot have been at all wild. Barbara Villiers, listing the plants of TQ28 for Atlas 2000, found London bur-marigold *Bidens connata* in a marsh on Sandy Heath, part of Hampstead Heath in Camden, where it was not deliberately introduced according to the Corporation's conservation officer, though it may well have been accidentally introduced on the trousers of his staff, as it is virtually unknown away from the canal system; she also passed on to me Johnnie Slattery's record of corn-salad *Valerianella locusta* from Lawn Road, Belsize Park. In Islington, there are Brian Wurzell's record of Italian toadflax *Cymbalaria pallida* from the neighbourhood of a derelict garden in Barnsbury, and my own of wall lettuce *Mycelis muralis* on Faringdon Station. Our meeting on 24 July went to Abney Park Cemetery in Hackney; although the flora of this cemetery has been very well recorded, by Mr Wurzell and others, the well-established plant of *Verbascum nigrum* appeared to be new.

I found a tuft of spiked sedge *Carex spicata* in a front garden in Addison Road, Holland Park in Kensington & Chelsea. In Hammersmith & Fulham, Mrs Norman found 'masses and masses' of round-leaved cranesbill *Geranium rotundifolium* in a derelict playing ground by Lillie Road; this is another species which has much increased in London in recent years. Leslie Williams's additions to his earlier lists from Brent include goldilocks buttercup *Ranunculus auricomus* in Old St Andrew's churchyard, Kingsbury, and sea club-rush *Bolboschoenus maritimus* in a ditch at Northwick Park. From Haringey, the most interesting report is perhaps David Bevan's from Coldfall Wood, that *Sorbus torminalis* can produce abundant seedlings given the chance by coppicing; he mentioned this in our *Newsletter*, and again more recently in an interesting article written jointly with Oliver Gilbert for *British Wildlife*. Mrs Boucher and Trevor James saw pampas-grass *Cortaderia selloana* from a train near Hornsey Station.

Lepidium latifolium was found on a bank above the up platform at Whitton Station, in Richmond upon Thames, by myself. In Hounslow, Carol and Bill Hawkins, working TQ07 for Atlas 2000, found opposite-leaved pondweed *Groenlandia densa* in the Longford River and Mary Clare Sheahan found grey club-rush *Schoenoplectus tabernaemontani* in Duke's Hollow by the Thames at Chiswick where it has previously been recorded as *S. lacustris*. Comprehensive lists of plants produced by Kate Haine, the conservation warden for the British Airports Authority, covering sites in Hounslow and Hillingdon, were kindly copied to me by Marjorie Shattock. Although close to Heathrow Airport, the site in Hillingdon which had the best 1996 Middlesex record is not yet one of those in the hands of the BAA; however it is at risk from the construction of a spur road to the M25 motorway, part of the plans for a fifth airport terminal. This is where Jacqui Shane rediscovered water avens *Geum rivale* in almost its last surviving south-east English locality, where it had not been seen since 1960; the original discovery, in a note written by John Lightfoot in about 1780 on the page of his copy of Hudson's *Flora Anglica* (a work to which he had contributed), describes the site as 'a boggy meadow on the left hand of the road from Colnbrook to London on the skirts of the county of Middlesex, about a mile from the Great Turnpike Road, and about a mile from Colnbrook' (cited by Kent 1975). Also near Heathrow Airport, but on the other side of the Great Turnpike Road, where the BAA is putting up a new headquarters building, Mrs

and Mr Hawkins reported large trefoil *Trifolium aureum* and field brome *Bromus arvensis*; I would be happier about these uncommon alien species if specimens of them had been produced. Still in Hillingdon, Dick Walker's records from the small Middlesex part of TQ09 included *Stellaria pallida* from a sandy patch of ground on Northwood Common. In Barnet, Mr Bevan reported that *Veronica scutellata* and lesser water-plantain *Baldellia ranunculoides* had benefited greatly from conservation work at Glebelands, where he and Mr Wurzell had also found a single plant of *Polystichum setiferum*. I should mention as an oddity the plant of water chickweed *Myosoton aquaticum* which Margo Nagle told me she had collected on the top level of a multi-storey car park in High Barnet.

In a back street of Staines I found *Torilis nodosa* and *Medicago arabica* together, in what I regard as part of the native population of these species in 'South-west Middlesex', which is now Surrey. Mr Tymkov had access to private ground at Stanwell which had *Echium vulgare*, marsh dock *Rumex palustris* and common meadow-rue *Thalictrum flavum*; the last, in spite of its name, is not at all common. Mrs Nagle's list from a new roadside near Shepperton was a strange mixture, including *Geranium rotundifolium*, *Cochlearia danica*, American winter-cress *Barbarea verna* and aubretia *Aubrieta deltoidea*. At our meeting of 17 August already mentioned, Mrs Hawkins looked over the vice-county boundary and saw *Sorbus torminalis* in Mimmshall Wood. Mrs Boucher, recording in this part of v.c. 21 for the Hertfordshire Flora Survey, found few plants of interest at Potters Bar, but they did include self-sown meadow-föam (I prefer the name poached-egg plant) *Limnanthes douglasii*.

V.C. 24, Bucks.

Surveying the Old Slade Nature Reserve, which is another site threatened by works in connection with the proposed Heathrow Airport Terminal 5, Mr Mullin found a huge colony of small-flowered buttercup, *Ranunculus parviflorus*, undoubtedly the largest in Britain, together with other annuals such as *Trifolium striatum*, *Sherardia arvensis* and early forget-me-not *Myosotis ramosissima*; these finds were reported to me by Mr Bevan, the Society's conservation officer, who spoke at the relevant public enquiry. The *Ranunculus* was no longer in evidence at the time of our meeting on 13 July, but in recompense we did find a few plants of *Rumex palustris* which is very rare in Bucks., *Echium vulgare*, musk thistle *Carduus nutans* and huge numbers of field pepperwort *Lepidium campestre*. Between Colnbrook and Old Slade, *Rumex palustris* was found in another place, in cow-trodden water at the side of the Coln Brook, and on a bank above the water nearby and in another place half a mile away to the west were a few plants of hairy buttercup *Ranunculus sardous*, the first record from the vice-county since before 1930. Finally I was privileged to obtain very full lists of the flora of Black Park and Langley Park, two country parks in our area with a fine heathland flora which have been sadly neglected by our botanical members in recent years, produced by Andy McVeigh the park ranger.

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Book review

Butterflies of Surrey. Graham A. Collins. 87 pp., 16 coloured plates, numerous maps. Surrey Wildlife Trust. 1995. £12. ISBN 0 9526065 0 X.

As London naturalists will be aware, a large proportion of Surrey falls within the LNHS recording area, so this book will be of direct relevance to anyone interested in the butterflies of this region. It may also come as something of a shock to learn that a county so close to London, which has provided a home for so many entomologists over the ages, has not had any aspect of its entomology covered, for the whole county, in any publication since the *Victoria County History* in 1902. Graham Collins's book draws together for the first time all records of butterflies for the entire county — right up to the River Thames in London, so updating the maps in *Butterflies of the London Area* published by the LNHS in 1987.

The introductory section deals with a range of topics covering recording history, characteristics of the county, a bibliography of Surrey and adjacent counties and a check-list. The main part of the book treats the butterfly species in taxonomic sequence giving, for each one, a summary of status, number of generations per year and foodplants followed by more general comments. Several appendices include a gazetteer, a list of larval foodplants, and references.

The taxonomy employed in this book may not please older entomologists, but is nevertheless as correct and up to date as the work itself is meticulous in accuracy — as indeed one would expect from this particular author. This is an excellent book, produced to a high standard on quality materials at a price which is affordable to most who will be interested. I can recommend it to anyone with an interest in butterflies generally and to naturalists concerned with the London Area butterflies in particular.

COLIN W. PLANT

As we go to press, we have received from the Surrey Wildlife Trust *Larger moths of Surrey*, also by Graham Collins. Ed.

Book review

The butterflies of Nunhead Cemetery. Richard A. Jones. Friends of Nunhead Cemetery. 1997. 32 pp. £3.25 + 60p post and packing from Friends of Nunhead Cemetery, 13 Bellwood Road, London SE15 3DE. ISBN 0 9508881 8 4.

Nunhead Cemetery is one of the two sites in the London Borough of Southwark rated by the London Ecology Unit as of Metropolitan Importance for nature conservation. It has achieved that status largely as a result of a period of neglect between the end of the Second World War and its compulsory purchase by Southwark Corporation in 1975. As Richard Jones's little book tells us, when the cemetery opened in 1840, it was surrounded by the pleasant fields, hedges and copses of the rural Surrey countryside. It was laid out as a formal 'very manicured' burial garden with 'nurseries, glasshouses and a phalanx of busy gardeners'. After the war, however, the owners, the London Cemetery Company, fell into financial difficulties and 'a wilderness of dense undergrowth crept over the once genteel landscaped parkland'. The cemetery is now a nature reserve, managed by the Borough and by the Friends of Nunhead Cemetery (FONC), a very active group of volunteers founded in 1981. Since this book was published, the newly formed Southwark Park Rangers have established a base there, and the cemetery is now open from 9 a.m. to 6 p.m. in the summer and 9 a.m. to 4 p.m. in the winter.

The butterflies of Nunhead Cemetery, which modestly describes itself as 'a visitor's guide', is a timely reminder that the sixteen species of butterfly which have been recorded there were able to colonize only because wild plants, including thistles and nettles, came in during the 1950s and 60s, when weeding was abandoned and many open areas went unmown. Now that the cemetery's period of neglect seems to be at an end, this book points out that a desire for tidiness and neatness should not be allowed to put at risk the diversity of its wildlife. The cover is illustrated by four of Richard Jones's beautiful colour photographs. The black-and-white photographs in the text are less clear, but all the species accounts are also illustrated by elegant black-and-white drawings, copied from Coleman, W.S. (1860), *British butterflies. Figures and descriptions of every native species etc etc*. There are descriptions, life histories and life cycle tables together with a note of the current distribution. The book includes both the sixteen species which have so far been recorded in the cemetery and a further thirteen which *could turn up*, and all twenty-nine are arranged in taxonomic order. I confess I wonder what the average visitor to Nunhead Cemetery will make of this, but I suppose he will keep turning the pages until he finds a drawing that looks like the butterfly he has just seen. The wisdom of the approach has just been demonstrated, as one of the 'possible' species, the brimstone, has been recorded since the book was published. All in all, it is a delightful little book and I hope it will encourage further recording, and above all sympathetic management.

RUTH DAY

Obituaries

ELLA MARGARET HILLMAN, B.SC., 1905–1996

With the death of Ella Hillman in October 1996, the London Natural History Society has lost one of its most energetic honorary vice-presidents. Ella joined the LNHS in 1946 and very quickly began a long term of service to the Society. Her name first appeared in its programme booklet in 1947, when she was elected to the committee of the Ramblers' Section, on which she served for four years. In 1951, she joined the committee of the Ecology Section, serving for fourteen years, including two years as chairman (1960–1961). During this period, she also sat on the committee of the Botany Section from 1951 to 1953. After an interval of some five years, she rejoined the Ecology Section Committee for a further sixteen years (1970–1985), including five years as the Section's Programme Secretary. In 1971, she undertook the duties of secretary to the editor of *The London Naturalist*, followed by eleven years as secretary to the LN Committee, remaining as a member of that committee for a further three years. Council had the benefit of her wide experience of the Society's field and other activities from 1960 to 1964 and again from 1971 to 1985, a total of twenty years as an elected member or as a sectional representative. In 1985 this outstanding service was recognized by Council, when it appointed Ella as an honorary vice-president. Even after this illustrious record, Ella took on the responsibilities of secretary of the Bookham Common Survey (1978–1988).

Among Ella Hillman's publications in *The London Naturalist* may be mentioned two on the 'Survey of *Ruscus aculeatus* on Bookham Common' (the first of these jointly with Audrey Warren), published in 1973 and 1979 respectively. Also in 1973, jointly with Rodney Burton, the 'Index to *The London Naturalist* 32–51 (1953–1972)' appeared. 'The bryophytes of Bookham Common 1941–1967' and 'Some observations on ladybird behaviour' were published in 1975 and 1984 respectively.

Ella Hillman, born on 15 March 1905, began her education at Christ's Hospital Girls' School, Hertford, moving on to Royal Holloway College, Egham, where she obtained a first class degree in mathematics. After teaching for three years in Newcastle she took up a post at Chislehurst & Sidcup County Grammar School for Girls, subsequently becoming head of the Maths Department, where she remained until her retirement.

Failing health eventually made it necessary for her to be moved into a nursing home, where she was well looked after and she remained cheerful. She died peacefully on 28 October 1996 and her cremation took place at the Breakspeare Crematorium, Ruislip on 8 November 1996 in the presence of relatives and friends, including friends from the Society. We are all the poorer for her passing.

P. C. HOLLAND and M. E. KENNEDY

JOHN WILLIAM COLES, 1920–1997

John Coles, who died on 25 April 1997, was a much-respected professional scientific member of the London Natural History Society. He joined in 1969 and almost immediately was elected to the Ecology Section Committee. When the Ecology and Entomology Sections merged in 1974 he remained on the new committee as Recorder for Mollusca and Worms and stayed in office until shortly before moving to Hampshire in 1987. He was an active participant in our Survey of Bookham Common for over twenty years, until a stroke in 1993 confined him to a wheelchair.

John Coles was born in Westminster on 16 November 1920, and from an early age had been interested in natural history. At eighteen he became a Fellow

of the Zoological Society of London. On the outbreak of the Second World War he was apprenticed to an analytical chemist, but this terminated when he was conscripted into the army. After the war he joined the Civil Service and worked at the Custom House, but in 1951 he transferred to the British Museum (Natural History) and joined the Nematode Section of the Department of Zoology where he remained until retirement in November 1981. Among his contributions to nematode biology and systematics were, in 1965, 'A critical review of the marine nematode genus *Euchromadora* de Man, 1886', and in 1977, 'Freeliving marine nematodes from southern Africa', both appearing in the Zoology series of the Museum's *Bulletin*. John's other main natural history interests focused around microscopy and he was very active in the Quekett Microscopical Club and the Marine Biological Association. The Hampshire Wildlife Trust and Haslemere Museum (where, since 1987, he was a worker with the Junior Science Club) benefited from his membership.

For more than ten years John was a regular volunteer at Queen Mary's Hospital for Children at Carshalton where he took in books, games and films. Some of the children, now in their late teens, continued to write to him after he left the area. His other interests outside natural history included preserved steam railways, old film projectors, classical music and early children's books. For many years he was secretary and *Newsletter* editor of the Children's Books History Society.

Before his stroke in 1993, by which he lost his speech and the use of his right arm, and was confined to a wheelchair, John had made notes for a paper entitled 'Freeliving nematodes in freshwater', and it was with great difficulty and perseverance that he managed to type the manuscript which was, to his great pleasure, accepted for publication in the *Quekett Journal of Microscopy* 37: 684–691 (1996). This, his last paper, includes several species collected from the ponds on Bookham Common.

We are privileged to have had John Coles sharing our activities for so many years, and in the writer's case, almost daily in the tea club throughout John's Museum years. To his wife Joyce, his daughter Shirley and his son John, we extend our sincere condolences.

KEITH H. HYATT

Book review

Feral pigeons. Richard F. Johnston and Marion Janiga. Oxford University Press. 1995. 320 pp. £67.50. ISBN 0 19 508409 8.

Feral pigeons *Columbia livia* are amongst the most globally widespread and abundant birds and yet are much overlooked by the average birdwatcher and ornithologist. This comprehensive treatise aims to set the record straight. The book is divided into seven sections, covering origins, reproductive biology, diet, plumage and flight, behaviour, population studies, environmental health concerns and interactions with man.

We learn that the rock pigeon was possibly the earliest domesticated bird which probably originated in southern Asia some 5,000–10,000 years ago. The spread westwards through Europe probably coincided with the advancement of crop cultivation. Feral pigeons have probably existed as long as have domestic pigeons and have evolved many times from escaped birds and genetic inbreeding with synanthropic rock pigeons. High fecundity combined with general tameness made rock pigeons eminently suitable for domestication.

The complexities of size, shape and genetic variation are all explored at great depth. Certainly a basic knowledge of morphology and genetics would be advantageous for full comprehension of this chapter.

Nearly a hundred pages are devoted to breeding biology. Unlike most birds, feral and domestic pigeons do not usually exhibit a seasonal breeding cycle and are capable of breeding all year round, although in higher latitudes there may be natural selection for more restrictive breeding. The ability to feed the young with a highly nutritive pigeons' milk secreted from the parents' crop, and hence the independence from high protein food sources, facilitates this extended breeding season. Life pairing and factors influencing mate choice are also examined as is the courtship ritual, which is illustrated with sketches.

The chapter on diet explores foraging habits, nutritional needs and preferences. The authors suggest that pigeons are far more selective in their feeding habits than popularly supposed. Certain agricultural seeds are favoured, with the birds being poorly adapted to feeding on many native wild seeds around the world.

The genetics of polymorphism are discussed with some sketches of the most common phenotypes. Useful diagrams assist in the comprehension of the dynamics of flight. The chapter on social behaviour is particularly interesting. Benefits of flocking include discovery of good foraging sites and predator avoidance; lone birds being more susceptible to attack. An interesting fact that I learnt is that a pigeon signalling flight intent movements will not necessarily cause other birds to fly, yet if the same bird flies up abruptly without signalling, the whole flock will rise together in so-called alarmed flight.

Factors affecting populations are explored with the attendant problems in conducting accurate census studies. One such study using capture–recapture methods missed 72 per cent of the population! Of particular interest to LNHS members is a brief history of feral pigeons in London.

Environmental factors looks at the effects of pollutants, predators, parasites and competition on feral pigeons. Pigeon control is examined with the most effective method being the removal of nest sites and food. This theme continues in the concluding chapter on the history of feral pigeons and man as are the topics of domestication, food sources, biomedical research and health risks. The book closes with a discussion of the problems of conserving the genetic stock of the ancestral rock pigeon, whose purity is in danger of being engulfed by the genes of feral and domestic pigeons.

Summarizing, a thorough academic text investigating most aspects of feral pigeons. An indispensable guide to any ornithologist intending to study feral pigeons seriously, although the reading may at times be a little indigestible to those with no scientific background. Certainly I found the volume fascinating in places and it gave me a new insight into an everyday bird which affords easy study at close quarters.

NEIL ANDERSON

Book review

Ticks of north-west Europe. Keys and notes for the identification of the species. Paul D. Hillyard. *Synopses of the British Fauna* (New Series), No. 52. Field Studies Council, Shrewbury. 1996. For The Linnean Society of London and The Estuarine and Coastal Sciences Association. 178 pp. £19.50 softback. ISBN 1 85153 257 9.

The *Synopses of the British Fauna* series was started by The Linnean Society of London in 1944 with a slim eleven-page booklet on the Opiliones, or harvestmen, by T. H. Savory, which was followed by a second edition in 1948. Over the years the series has progressed, keeping pace with developments in the field and laboratory studies as well as changes in nomenclature. The New Series commenced in 1970, and in fact, the harvestmen volume, in a much-enlarged edition by J. H. P. Sankey and T. H. Savory, appeared as N.S. No.4 (1974), only to be expanded again in 1989 by P. D. Hillyard and J. H. P. Sankey. Importantly, the series has not lost sight of its aim to cater for the needs of amateur and professional naturalists and zoologists from sixth-form level upwards. Relevant technical terms are clearly explained as these do vary from group to group. It is obvious from the above that the series has progressed a long way and is widely acclaimed and respected for fulfilling its stated aims.

This is the first occasion that ticks have been the subject of the *Synopses* and now that this number has appeared there can be nothing but praise for the amount of thought that has gone into it to enable the non-specialist to pursue the identification of the British species.

Tick workers of several generations have needed to be specialists, and it wasn't until 1963 that the late Professor Don R. Arthur's much-needed *British ticks* appeared. Unfortunately, that well-received work became out of print far too soon and many students tried in vain to obtain a copy. This attention, however, soon highlighted the need (through no fault of its author) for a more-detailed study, which it had no doubt stimulated. Fortunately, since then, several European and North American specialists have been working actively on the world's ticks, not least with the material in the collections of The Natural History Museum in London. Mr Hillyard has been able to benefit from this recent attention, and through his own expertise the result is a first-class contribution to the fauna of north-west Europe.

The work opens with introductory remarks on ticks and their place in history. This is followed by their disease-carrying importance, including, of course, their role in the transmission of Lyme disease, the most serious arthropod-borne human disease of Europe and North America, which has been of public concern in recent years due to the spread of bracken and the ticks which it harbours. Then comes methods of collection and control, including rearing ticks in the laboratory, the many aspects of tick biology, and tick-host associations. This is followed by the bulk of the volume — the systematics and identifications of the twenty-six included species. This section is extremely well keyed and figured, with clear drawings showing the important diagnostic features indicated by arrows. These critical figures appear both alongside the keys and with the species descriptions. In several taxa the differences are very subtle, especially if you do not know the host involved, and the clear figures and their presentation are a great help. Finally comes a list of mammal and bird hosts (excluding the few reptile hosts), and extremely valuable glossary of around two hundred terms, and over two hundred references.

This reviewer found using the work most satisfactory, but was unhappy with a few points of editorial concern. There is an excessive amount of blank space on many of the pages where figures or keys could have been taken back, though still starting the species accounts on a fresh page. This could have resulted in a slightly thinner and possibly less-expensive volume. Also, and strangely, there is, in some cases, considerable variation between the headings and subheadings in the Contents and their renderings in the text, as well as a curious random use of upper case within some of the titles. Lastly, care should have been taken to ensure that the years referred to in dates of collection of some of the material figured had been given in full, for example, 8.10.1972 and not 8.10.72. These points do not, however, prevent me from commending this work for maintaining the established high standard of the series.

K. H. HYATT

Book review

The Crocus King. E. A. Bowles of Myddelton House. Bryan Hewitt. The Rockingham Press, Ware. 1997. 104 pp. £6.95 (paperback) ISBN 1 873468 47 4. £12.95 (clothbound) ISBN 1 873468 56 3.

This is a biography of Edward Augustus ('Gussy') Bowles (1865–1954), one of the most distinguished horticulturists of all time. Bowles was born at Myddelton House, Enfield, in the delightful rural setting of the northern heights of Middlesex, and here he was to remain during his long life. Educated privately at home and later at Jesus College, Cambridge, he was from his youth a benevolent friend of the poor of Enfield, providing them with food and with clothing. His great love of plants dated back to childhood, and he was also no mean artist, producing many fine paintings and drawings of his favourite subjects. His interest in *Crocus* dated back to 1891 and was probably stimulated by the publication in 1886 of George Maw's *Monograph of the genus Crocus*, a superlative volume containing drawings of *Crocus* species that John Ruskin described as 'most exquisite and quite beyond criticism'. By 1895 Bowles had brought into cultivation 135 taxa of the genus and by 1909 was growing most of the species of *Crocus* that could be cultivated in the British Isles as well as raising a host of hybrids and cultivars, particularly in *C. chrysanthus*. The experience gained in these studies culminated in the publication in 1924 of his *Handbook of Crocus and Colchicum for gardeners*, a second edition of which appeared in 1952.

Bryan Hewitt has written a delightful and very readable book crammed full of anecdotes about Bowles and his many friends, and it is amusing to note that Bowles's one visit to the cinema was to see Walt Disney's *Snow White and the Seven Dwarfs*. With its two appendices 'Key dates in the life of E. A. Bowles' and 'Plants raised by E. A. Bowles or named after him', the volume is a worthy tribute to one of the truly great plantsmen.

D. H. KENT

E. A. Bowles's famous 'trilogy', *My garden in spring*, *My garden in summer* and *My garden in autumn and winter* is currently being reprinted by Timber Press, Swavesey, Cambridge. The first named appeared in May 1997 and the second and third are scheduled for 1998. 'Gussie' Bowles was not only a great horticulturist, he was an accomplished entomologist and a sometime member of the London Natural History Society. His garden at Myddelton House, Bulls Cross, Enfield is being restored and is open to the public. Ed.

Book reviews index

<i>The moths and butterflies of Great Britain and Ireland.</i> Edited by A. Maitland Emmet	36
<i>Flora of Ashdown Forest.</i> Tim Rich and eleven others.	66
<i>Dandelions of Great Britain and Ireland.</i> A. A. Dudman and A. J. Richards	82
<i>New flora of the British Isles.</i> Second edition. Clive Stace	104
<i>Dragonflies of Surrey.</i> Peter Follett	128
<i>Blowflies.</i> Zakaria Erzinçlioğlu	132
<i>More conservation pieces.</i> Humphrey Mackworth-Praed	152
<i>Animals under logs and stones.</i> C. Philip Wheater and Helen J. Read	190
<i>Ants.</i> Gary Skinner and Geoffrey W. Allen	190
<i>Butterflies of Surrey.</i> Graham A. Collins	201
<i>The butterflies of Nunhead Cemetery.</i> Richard A. Jones	202
<i>Feral pigeons.</i> Richard F. Johnston and Marion Janiga	205
<i>Ticks of north-west Europe.</i> Paul D. Hillyard	206
<i>The Crocus King.</i> E. A. Bowles of Myddelton House. Bryan Hewitt ..	207

The London Naturalist

Instructions to contributors

Submission of papers

Papers should be submitted **in duplicate** to the editor, Mr K. H. Hyatt, at (preferably) his home address, or c/o Department of Zoology, The Natural History Museum, Cromwell Road, London SW7 5BD, before the end of January if they are to be considered for publication in the same year. However, the editor may be contacted at any time to discuss possible contributions, and will be pleased to send a recent offprint to show our style, and as a guide to preparing the manuscript. Manuscripts should be typed **double spaced** on one side of the paper only and with wide (3-cm) margins. Authors must retain a copy. Papers should include at the beginning an **abstract, summary or synopsis. Sheets must be numbered.** The editor would be pleased to receive contributions as ASCII files on disc (either 3½" or 5¼") in IBM-compatible format as well as in manuscript as above. Papers should be relevant to the natural history and archaeology of the London Area. This includes comparisons between London and its surrounding countryside with other localities, as well as work relating to or comparing species or habitats which occur in the London Area.

Text

Locality spellings should follow the latest editions of the maps published by the Ordnance Survey. Capitalization should be kept to a minimum. Common names of animals and plants must begin with lower-case initials, and **only** Latin names of genera and species must be underlined. When both common and Latin names are given there should be no brackets or commas separating them. **Genus names should appear in full where first used within each paragraph.** When scientific names are taken from a standard work, which must be cited, authorities should be omitted. In descriptive matter numbers under 100 should be in words, except in a strictly numerical context. Dates in the text should follow the logical sequence of day, month, year, i.e., 25 December 1971, but in lists as 25.xii.1971. Measurements should be in metric and follow the SI system (Système International d'Unités), with imperial equivalents in parentheses where appropriate. There should be no full point following Dr, Mr, Mrs, or St. Lists should be in systematic, alphabetical or numerical order. **Hyphens should not appear at the end of lines** as the right-hand margins of manuscripts do not need to be justified. **Tables should be typed on separate sheets at the end of the text. Word-processed text should not use italic, bold or compressed typeface. Paragraphs should be indented. Sentences must not begin with numerals.**

References

Reference citation should be based on the Madison rules (*Bull. Torrey bot. Club* **22**: 130–132 (1895)), except that a colon should always precede a page number. Capitalization in titles of books and papers in journals should be kept to a minimum. Journal titles should be in full or follow the abbreviations in the *World list of scientific periodicals* and be underlined. Book titles should also be underlined.

Examples are as follows:

In text:

Meadows (1970:80) or (Meadows 1970).

In references:

MEADOWS, B. S. 1970. Observations on the return of fishes to a polluted tributary of the River Thames 1964–9. *Lond. Nat.* **49**: 76–81.

MELLANBY, K. 1970. *Pesticides and pollution*. Ed.2. Collins, London.

WHITE, K. G. 1959. Dimsdale Hall moat, part II. *Trans. a. Rep. N. Staffs. Fld Club* **92**: 39–45.

Authors must ensure that all references are cited accurately: they will not be checked by the editor.

Illustrations

Distribution maps should be submitted in the form of a recording map with symbols in Indian ink and stencilled or by transfers, e.g., 'Letraset'. Solid dots are used to indicate contemporary or recent presence, circles for old records, and crosses (not pluses) for other information, such as introduced species. The caption should be written outside the frame of the map and will be set up by the printer.

Line drawings should be in Indian ink on white card or tracing paper, larger than the printed size, but no larger than A4. Place names, etc., must be produced with stencils or Letraset. Captions should be separate as they will be set up by the printer, but keys that include special characters should be included within the border of the figure.

Photographs should be glossy black-and-white prints, of good contrast, preferably plate or half-plate in size, or, following consultation with the editor, in the form of colour transparencies, either 35 mm or larger. Colour prints are also suitable for reproduction in the text in black and white.

Proofs

Proofs will be sent to authors for scrutiny, but only essential corrections can be made at that stage.

Offprints and reprints

Up to 25 free, unbacked offprints will be supplied on request. Additional copies may be purchased if ordered when the proofs are returned.

Backed and folded, wire-stitched reprints, with or without covers, may be purchased by authors following consultation with the editor.

Silver-washed fritillary and grizzled skipper	<i>Frontispiece</i>
Officers for 1997	3
The Society's recorders.....	4
Report of the Society for 1996	6
Official and sectional reports for 1996	11-14
SPARKES, T. H., CAREY, P. D. and COOMBES, J. — First leafing dates of trees in Surrey between 1947 and 1996.....	15-20
BOREHAM, S. and MOXEY, P. A. — A century of vegetation change in Epping Forest determined from pollen analysis of pond sediments	21-35
WILTSHIRE, ELINOR — Uncommon trees in London.....	37-66
WILLIAMS, L. R. and FOWLER, J. A. — Towards a 'common plant census' to monitor environmental change	67-78
JONES, R. A. — Life on the edge — a caution on the precise demarcation of Watsonian vice-county boundaries in the London Area	79-81
TEAGLE, W. G. — Blackheath in the 1950s and 1960s	83-103
MORRIS, R. K. A. — The Hymenoptera of Mitcham Common: the fauna of a south London grass heath, with comments on the use of site quality scores for site evaluation.....	105-127
STRANGEMAN, P. J. — Notes on the birds of Nine Elms, Inner London, in the 1970s.....	129-132
PAICE, MICHAEL R. and GLAVES, PETER — A study of the sparrowhawk <i>Accipiter nisus</i> and the kestrel <i>Falco tinnunculus</i> in an urban environment	133-152
MILNER, J. EDWARD — Spider records for the London Area in 1996.....	153-156
PLANT, COLIN W. — A review of the butterflies and moths (Lepidoptera) of the London Area for 1995 and 1996	157-174
Survey of Bookham Common: Fifty-fifth year. Progress report for 1996.....	175-189
BOWLT, COLIN — The Hampstead Heath Survey: a long-term look at the Heath by the London Natural History Society	191-192
BURTON, RODNEY M. — Botanical records for 1996.....	193-201
Obituaries:	
ELLA MARGARET HILLMAN, 1905-1996	203
JOHN WILLIAM COLES, 1920-1997.....	203
Book reviews index	208

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